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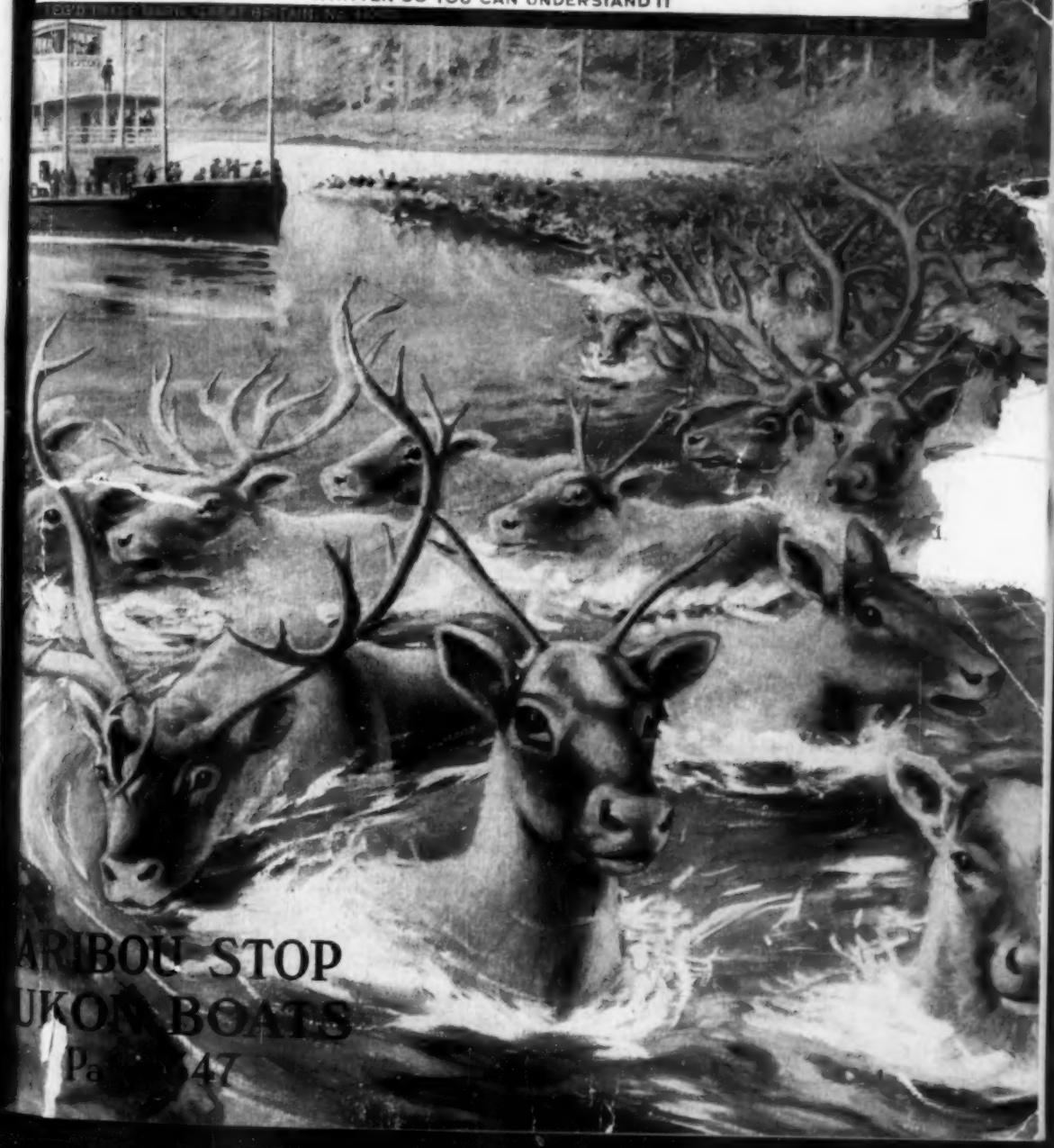
# POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT



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"The Wood Eternal"

# "A Kitchen-Cabinet, a la Son"

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# Popular Mechanics Magazine

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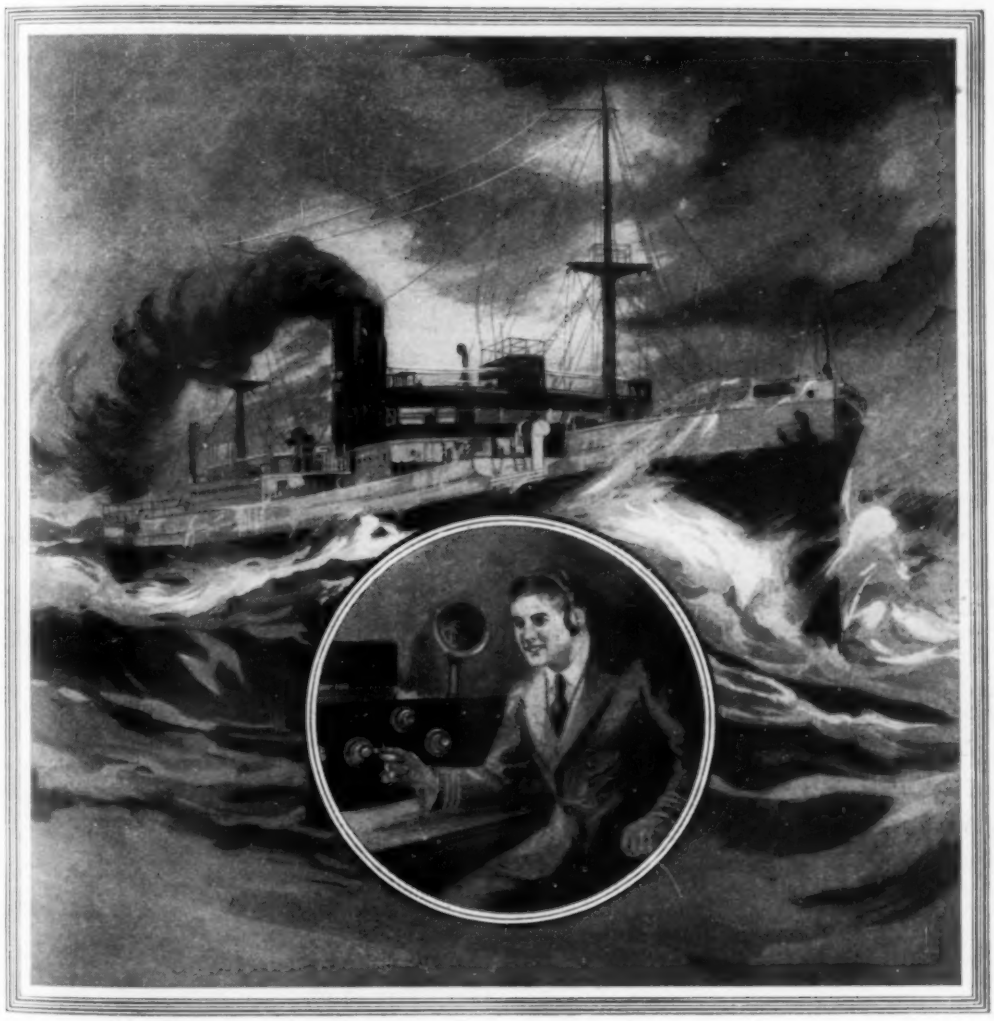
Vol. 39 MARCH, 1923 No. 3


## "THE DAUGHTERS OF THE SEA"

By LAWRENCE Wm. PEDROSE

FOR the purpose of making more comfortable and pleasant the hours spent in their home ports by the masters, mates, and pilots of the Pacific, and developing radio broadcasting to their ships while at sea, wives, daughters, and sweethearts of mariners living at Seattle have formed an organization called the "Daughters of the Sea."

The Daughters of the Sea plan to bring the home closer to the ship, and the radio will be their chief means toward that end. The club has undertaken the fitting up of quarters on the top floor of one of the



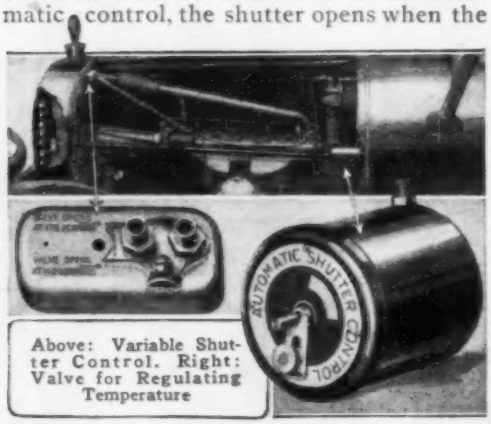
city's tall buildings, and is furnishing them with a library, comfortable chairs, smoking accessories, and marine glasses, so that seafarers may watch from the windows the ships making and leaving port.

A powerful radio sending and receiving apparatus is to be installed on the roof of the building, and entertainments, concerts, etc., held in the club rooms will be broadcast to the ships at sea. The personnel of vessels in any storm area will be cheered by the voices of loved ones at home. A practical service also will be maintained; the location of all ships from the home port will be recorded from day to day. The plans also include the entertainment of visiting captains from other ports of the world. There will be a committee supplying all arriving ships with flowers, and seamen strangers will be provided with comfort and entertainment.

One of the chief duties of members of the new organization is to see to it that every captain has in his ship's quarters the photographs of those dearest to him. Another obligation on the part of members is that of planning pleasant surprises in the homes of mariners when they return from voyages. Eventually, it is expected, the Daughters of the Sea will extend their work to all countries by establishing branch chapters.

## RADIATOR'S TEMPERATURE CONTROLLED BY DRIVER

By a newly devised combination of automobile-radiator shutter and an automatic control, the shutter opens when the water becomes too warm and closes as it cools. The water temperature may be varied as the driver wills, by means of a valve operated by a thermostatic control that regulates the flow of water through the cylinder jackets and radiator, increasing or diminishing the flow as more or less heat is desired.



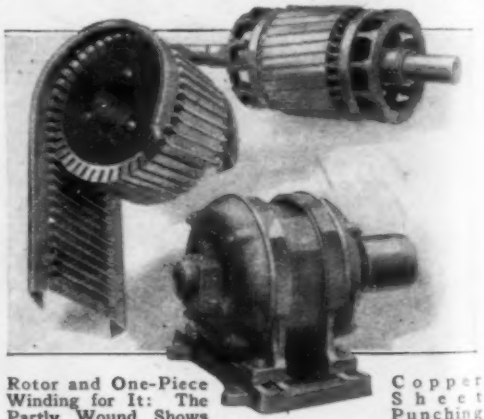

Above: Variable Shutter Control. Right: Valve for Regulating Temperature

## INDIA'S TELEPHONE SYSTEM TO HAVE WIDE EXPANSION

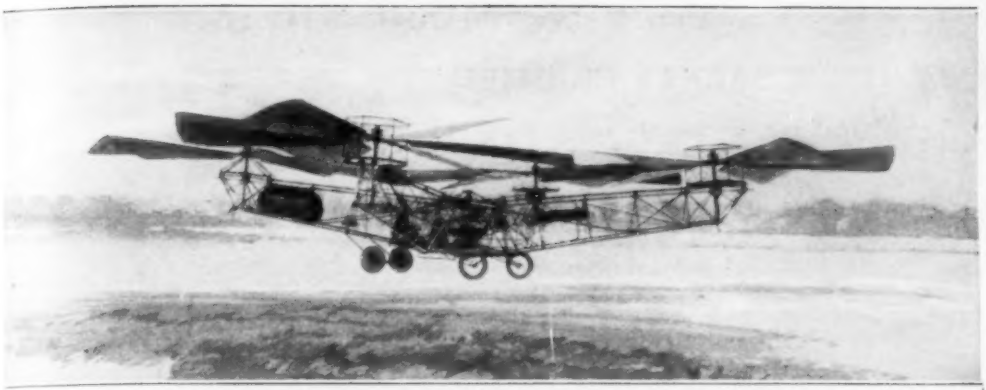
The long-distance telephone system of India is having a rapid expansion under the plans of the government telegraph department. The program provides for the line from Bombay to Calcutta, under the Arabian Sea, as the first link, to be followed by one from Bombay to Delhi in the north, close to the Himalayas. These will be completed in about 12 months. Progress of the work depends mainly on appropriations by the civil divisions, as it is to be done by the provincial governments. With the work complete, Kashmir, just south of wild Turkestan, may be rung up from Bombay, on the Gulf of Bengal, or Cape Comorin on the Indian Ocean.

## NEW MOTOR HAS ONE-PIECE ROTOR WINDING

A departure from standardized electric-motor construction has been made in a rotor winding which is formed in one piece. In the ordinary type of squirrel-cage motor, each bar is individually joined to the end rings, making a number of joints. In the form described, the entire winding consists of an integral sheet of copper, punched, formed, and machine-wrapped around the motor core, the copper bars being swaged into the core slots.



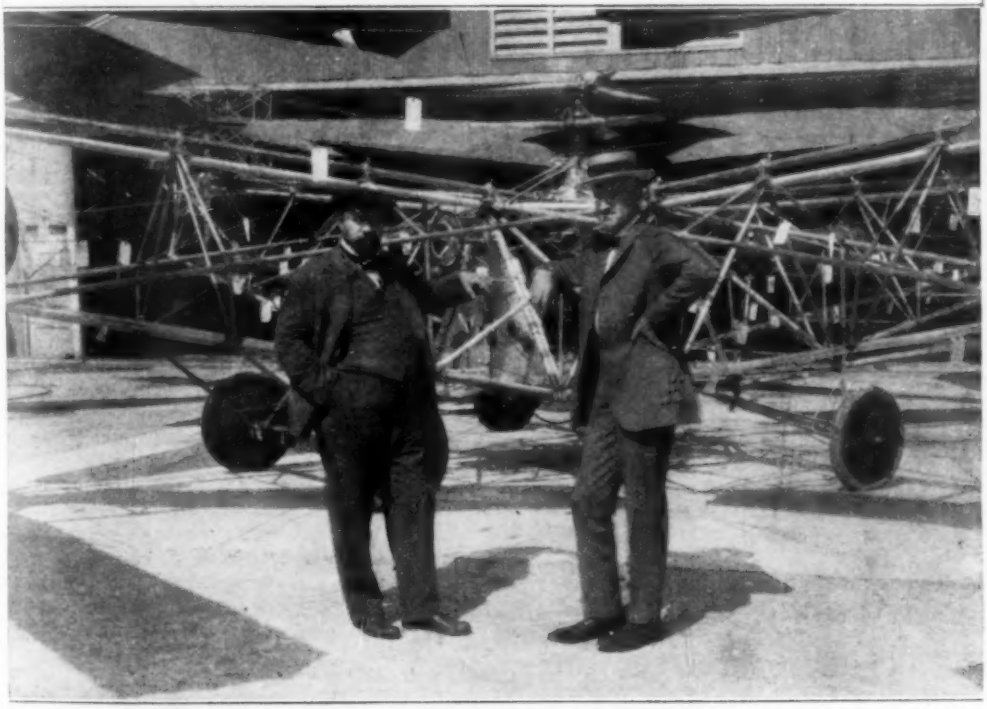
Rotor and One-Piece Copper Sheet Winding for It: The Partly Wound Shows Punching and Manner of Winding to Form Integral Joint with End Rings



Latest Flying Machine of the Helicopter Type Just After It had Taken Off from the Ground in One of Its Recent Trial Flights: The Machine Has Four Six-Bladed Propellers, Each with a Lifting Capacity of About 1,000 Pounds

## LATEST HELICOPTER MAKES FLIGHT

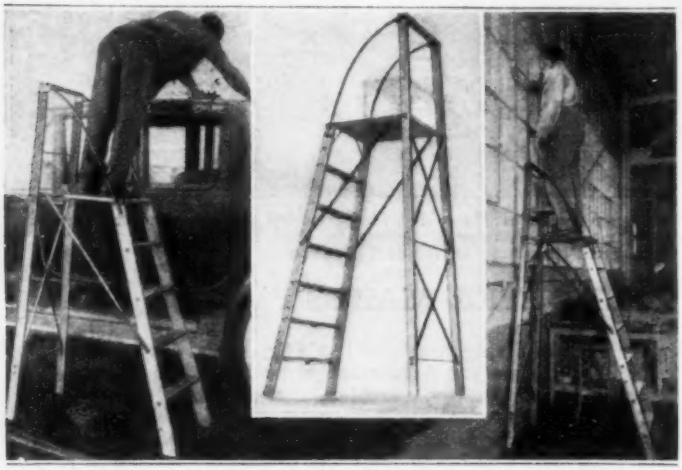
THE latest in the helicopter type of flying machine made its initial flight a short time ago when it remained in the air for 1 minute 40 seconds and reached a height of 8 feet. In several later ascensions the machine, carrying two passengers, rose 3 feet above the ground. Helicopters continue to attract considerable attention on account of their ability to rise vertically from the ground and to land in a small area. While the height attained by this helicopter may not seem very impressive, it can be argued that the first trial trip of the Wrights lasted only 59 seconds. The machine was built at McCook field under the supervision of the inventor, Dr. Geo. de Bothezat, a Russian scientist. It is equipped with four lifting propellers, each having six blades and a diameter of 10 feet, and it has provision for flying horizontally. The machine measures 60 feet from tip to tip and has a total lifting capacity of nearly 4,000 pounds.



Doctor Geo. de Bothezat, Inventor of the Latest Helicopter, Stands at the Left. Colonel Thurman H. Bane, Until Recently Commandant at McCook Flying Field, Who Piloted the Machine on Its First Flight, Appears at the Right, Leaning against the Machine

## MAXIMUM SAFETY CLAIMED FOR NEW STEPLADDER

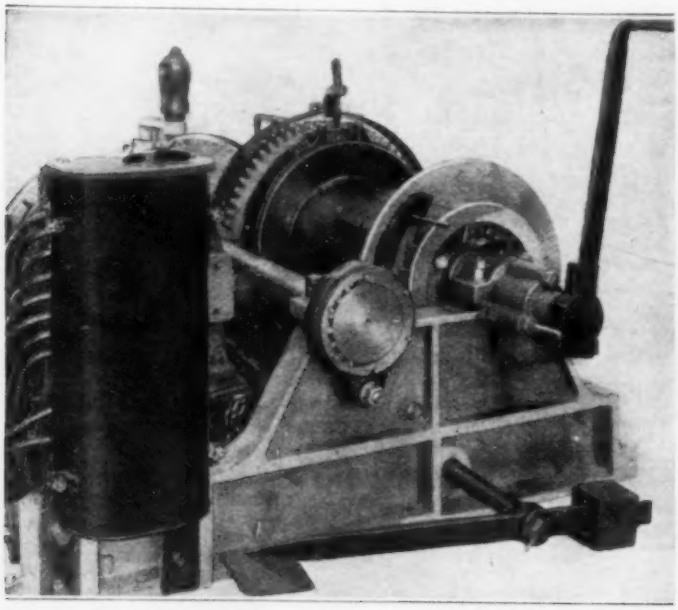
A maximum degree of safety is claimed for a new folding stepladder built with widely separated legs and a large working platform at the top. Two benefits are derived from the construction of the legs, one that shaking and upsetting are practically eliminated, and the other that it is possible to place the ladder over machinery or other obstructions. The platform itself provides a large railed-in space on which the workman may stand, confident that he will not fall. There is room enough for a pail or other material, though if desired the back half of the platform may be raised and used for this purpose. This raised portion also serves as an extra step when reaching toward particularly high places.



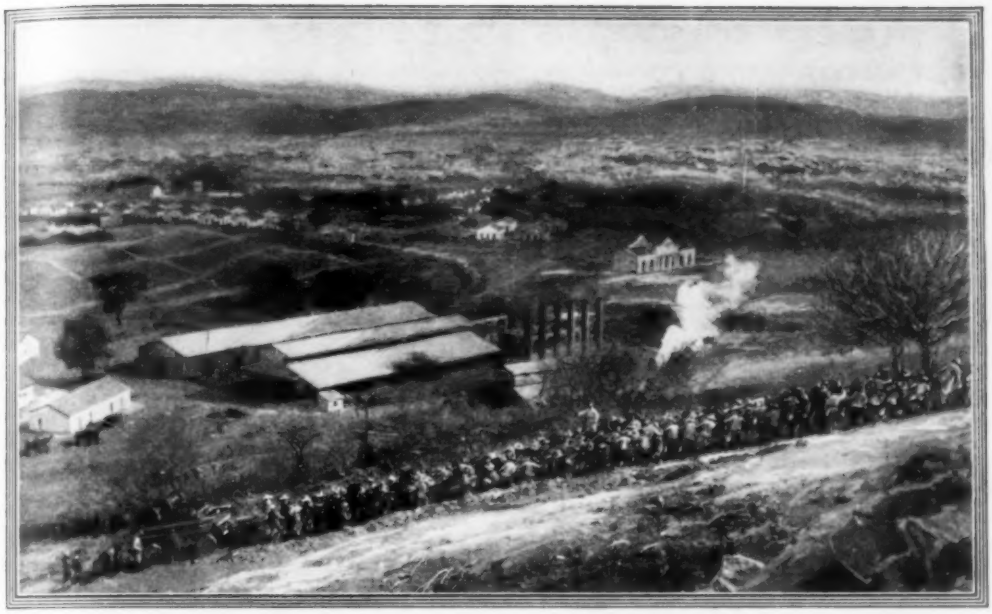
New Stepladder Which is Claimed to Have a Maximum Degree of Safety: Right, Note the Raised Portion of the Platform; Left, a View Indicating the Stability of the Ladder

## IMPROVEMENTS IN HOISTING MACHINES

In the design of hoisting apparatus, several new features have been incorporated. For hoists using standard electric motors without solenoid brakes, a patented automatic brake holds the load suspended, preventing it from falling, in case of failure of the electric current. A third-drum extension is provided for converting a double-drum steam or electric hoist into a triple-drum machine. It can be attached to any existing hoist by bolting it onto the main frame. Another innovation is a nonburning friction block, made of metallic asbestos, which is said to increase the efficiency 35 per cent. For use on heavy-duty derricks with long hoists at high speed, the brake flanges are cooled by means of openings through which the air can circulate. An improved cut-steel friction screw with special thread, makes the clutch operate more easily.



Hoist for Use with Standard Electric Motors without Solenoid Brakes, Which Has an Automatic Safety Brake and an Improved Screw That Reduces the Work of Operating the Friction Clutch



Pulling Equipment Uphill by Man Power, with 250 Men in Line, for Construction of Great Dam, to be Built by American Engineers: Buildings, Sheds, and Mills in the Background Are in the Basin, to be Filled with Water Later. Owing to Primitive Conditions, Man Power is Used

# SAVING WATER FOR BRAZILIAN STATES

## One of the World's Greatest Conservation Projects—Dams and Reservoirs to Hold Back and Store Torrential Rains—Supply for Five Years Required—Scourge to be Lifted from Stricken Provinces

BY A. S. CHAPMAN

PLANS of the Brazilian government for water storage and irrigation in several states of its territory now being put into execution make them one of the greatest engineering projects ever undertaken in the world. In brief, their object is the reclaiming from drought and making permanently habitable the states of Ceara, Parahyba, Rio Grande do Norte, and parts of Piauhy, Bahia, and Pernambuco, in northeastern Brazil, with a population in the neighborhood of 2,500,000. Ever since their first settlement by Portuguese colonists, these states have been subject to periodic droughts, which dried up vegetation, baked the earth hard, killed the live stock, and drove the people from their homes.

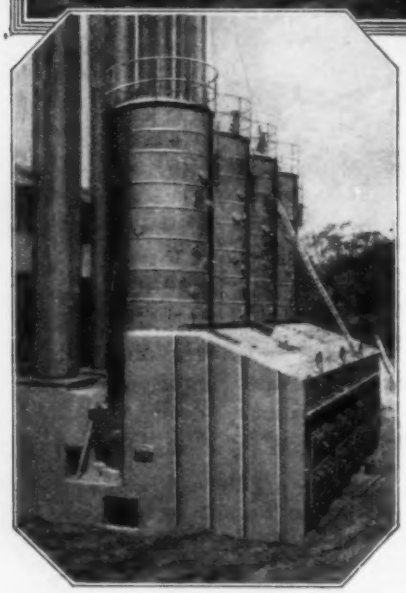
Droughts such as those which made these states uninhabitable for years at a time are almost beyond belief in comparison with the ordinary "dry spell" as it is known to us. In 1723, a drought began which lasted for five years. Another, beginning in 1877, had a duration of two and a half years. Yet in spite of these visitations, the country is so fertile under normal conditions, the climate so agreeable, and living conditions so attractive, that the people returned and attempted to make homes again, only to be driven out by another scourge of the same kind.

Following the drought of 1877, Dom Pedro, the last emperor of Brazil, undertook on his own responsibility plans for reclaiming these fertile lands. Work was continued in an intermittent way till now a project is being worked out by two English engineering companies and one New York company.

The problem is not that of conserving rainfall and distributing it during the dry season of the year, but the collection and storage of a total supply sufficient to carry the people and their crops and animals during a prolonged absence of rain. The reservoirs will be called upon with certainty, every five or six years, to furnish a large part of the total supply without replenishment for a period of 30 months. The problem is complicated by many factors. There are occasional seasons when the rainfall is in excess of 60 inches, and the rivers carry tremendous floods. The streams are on steep gradients, and they drain themselves down to the sandy beds soon after the rains

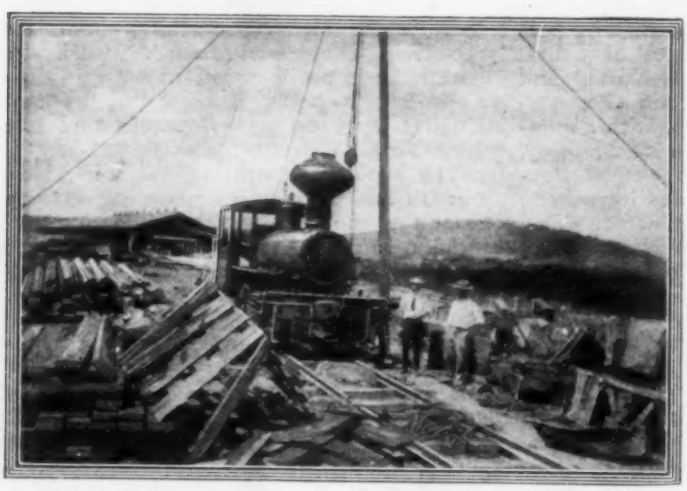
PHOTOS BY COURTESY

**Panorama of East Side of Dam Site at Poco dos Paus, Which Gives Dam and Reservoir: High Hills, Valley, and Watercourse are Included. Irrigation. Owing to the Lack of Railways, All Equipment and Bo... Left: Boilers Complete Ex...**



cease. There are no snows nor accumulations of ice to melt slowly, no swamps to give up their stores of water gradually. After the rainy season, with its torrential falls running quickly to the sea, comes the regular dry season—perhaps, a drought lasting several years.

The reclamation is executed under the supervision of a special federal department that is in charge of all works to overcome the effects of these prolonged droughts. The first to be undertaken was the construction of a network of railroads and highways, of immediate use to the country and indispensable in carrying on the work. Next came the construction of great reservoirs. Three contracts have been made for the project. One English engineering company has the port works at Fortaleza, Ceara, completion of a dam at Acarape, and construction of dams at Patu and Quixeramobim, also in the state of Ceara. Another English company has the contract for dams at Gargalheira and Parelhas in Rio Grande do Norte, and for port works at Parahyba. The New York company is administrators for the construction of dams at Poco dos Paus, Oros, Piranhas Piloes, and Sao Gonçalo, in Rio Grande do Norte. All the contracts are identical and call for work to be paid for on a cost-plus basis. The present year should see some of the reservoirs in partial operation.

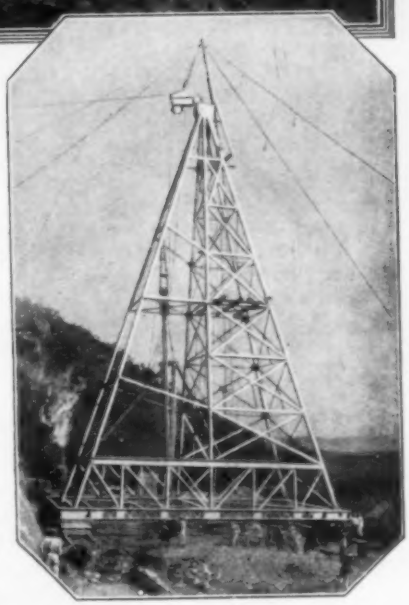


**American Engineers Supervising the Erection of a "Dinkey" Locomotive, with Its Shed and Tracks: The Engine Is a Wood Burner, as Coal would Be Entirely Too Costly, and There Is, Fortunately, an Abundant Timber Supply**

All of the dams are of the first magnitude, com-

DWIGHT P. ROBINSON, INC.

an Idea of the **Magnitude of Operation in the Construction of a Single** in Its Scope, **Converting It into a Lake for Impounding Water for** ing Material had to be Moved to the Dam Sites by Primitive Methods. Walkways. Right: **Tail Tower**



paring with the greatest engineering operations of the world in difficulties of construction. According to present plans, all construction equipment of the American company will be operated by electricity, to be generated by steam boilers using wood for fuel. Dams will be equipped with aerial cableways, concrete-spouting systems, steel derricks, compressed-air drills, and all minor appliances for construction.

To reduce transportation costs, the works will be supplied with cement ground in a mill now under erection at Fortaleza (or Ceara), the unground clinker being bought in foreign markets and transported to Fortaleza in bulk.

The reservoirs constructed by the American engineers will have a total capacity of 120,000,000,000 cubic feet of water. If the full contents of these reservoirs were poured over the land area of Connecticut and one-third of Rhode Island, it would cover them with water to the depth of a foot.

The big project has an important economic value. But for the drought, the states would be fertile and produce abundant crops of rubber and other commodities. Cattle, goats, and sheep are raised in great numbers, and their hides and skins form a considerable article of commerce. But under dry-weather conditions the production of the country is uncertain and the people are likely at any time to be driven out and compelled to seek new homes.

**Map of Territory in Northeastern Brazil, Where American and English Engineers are Carrying Out the Gigantic Conservation Project, Which has Gone On Intermittently for Some 40 Years: The Dark Areas Show the Reservoir Sites**

## MOVABLE ICE CHEST MADE FOR HOSPITAL USE

A small movable chest for holding chipped ice has been made for use in hospitals. The chest, mounted on a rubber-wheeled carriage, resembles a fireless cooker in appearance and construction, and has a faucet for draining off water. Aluminum is used as the lining on the interior. In small spaces, it turns in its own length.

## BRIDGE ACROSS GOLDEN GATE TO BE WORLD'S LONGEST

A combined suspension and cantilever bridge with a span of 4,000 feet and a total length of 6,700 feet, will soon be built across Golden Gate, San Francisco Bay, if a proposition to that effect in the California legislature is passed. It is said that there is no opposition to the bill and all that remains to be done is to complete the financial details.

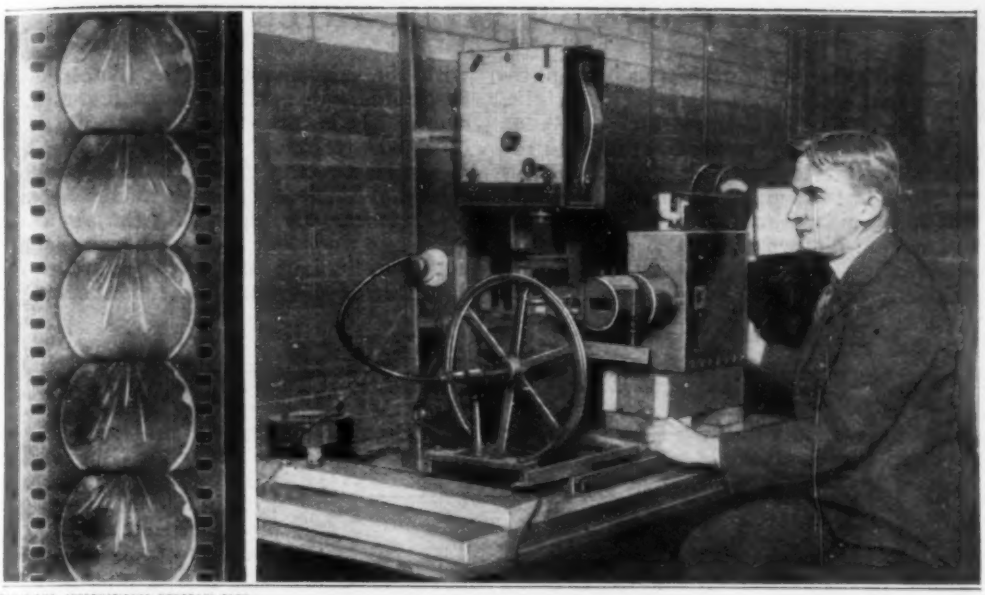
Extending centerward from the towers, which are to rise 1,010 feet above the water level, or slightly higher than the Eiffel Tower, triangular trusses will reach out for a distance of 700 feet and form anchorages for the suspension cables of the 4,000-foot span. Only one deck is to be built, and that will be 200 feet above the water level, as compared with the 135-foot clearance of the Brooklyn Bridge of New York.

The bridge will connect Fort Point, on the San Francisco side, with Line Point, in Marin County, on the north. The cost will be about 20,000,000 dollars.

## WEED PULLER SAVES BACK BENDING OR KNEELING

A newly devised weed puller makes it possible to rid the lawn of plantains, dandelions, or other weeds without the back-breaking work of bending over to cut them with a knife. With one motion of the hands the puller is opened, another forces it into the ground, and a third pulls the weed. It may be used also in gardens or places hard to get at by hand. A feature that most home gardeners will appreciate as much as the usefulness of the tool, is that it saves the hands from dirt stains.

Bridge with 4,000-Foot Suspension Span and 6,700-Foot Total Length Which It is Expected will be Built across Golden Gate, San Francisco: Two Piers, to Rest on Rock Ledges 50 Feet below Water Level, will Support the Towers, 1,010 Feet High. The Deck will Be 200 Feet above Water Level



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Left: Moving-Picture Film, Showing the Tracks of Helium Nuclei Traveling through Air at 20,000 Times the Speed of a Rifle Bullet. Right: Professor Harkins and the Apparatus, Made by His Assistant, R. W. Ryan, That was Used in Photographing the Flight of Atoms

# THE FLIGHT OF ATOMS PHOTOGRAPHED

By W. D. HARKINS

*Professor of Physical Chemistry, University of Chicago*

AN atom is 2,000 times too small to be seen through a microscope and it is apt to stagger the imagination of most people to hear about photographing atoms in flight. Not so long ago an atom was spoken of as the smallest particle of matter, but now it is believed to represent a grouping of electrons around a nucleus, much in the manner that the planets arranged around the sun constitute the solar system.

Air that is not too dry, confined in a cylinder and alternately compressed and expanded under the action of a piston, will produce a mist of minute water particles similar to a rain cloud. If the cylinder is vertical, and the head and upper part of the walls are made of glass, and with sufficient illumination, this phenomenon can be seen with the naked eye as the miniature fog settles toward the piston.

Appearance of Upper Glass Portion of Cylinder When Brilliantly Illuminated, at the Instant Atom Tracks are Formed: Note Collision between Two Atom Nuclei Shown by Forked Trail at the Left

In further developing the apparatus, the terminals of an electric circuit of high voltage are connected at the top and bottom of the cylinder and in circuit with a device that makes contact at the proper instant during the stroke of the piston. Charged helium atoms, or nuclei, emanating from a speck of radioactive material, called polonium, located on the side of the cylinder, are projected through the air, and about 200,000 minute water drops deposited in the path of each helium atom, each making what appears like the trail of a tiny skyrocket. The helium nuclei, or part atoms, travel at a speed 20,000 times that of a rifle bullet, and as they pass through the atoms in the air, they bump into the atom parts, called electrons, knocking them out of the atoms, which is called ionizing or charging the atoms, producing the effect seen in the trails in one of the illustrations. On each electron thus knocked out, and on each ion left by tearing an electron out of an atom, a minute water drop deposits itself. A great number of these drops, as described above, constitute each atom

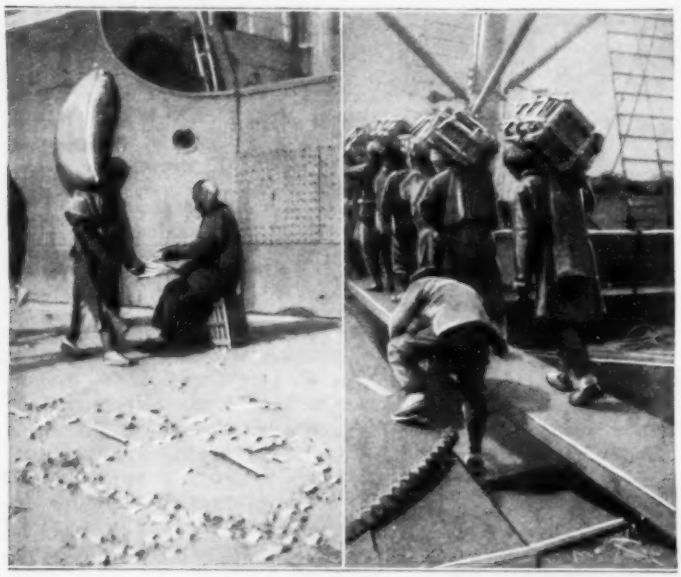
track, which when illuminated by a powerful arc light, are extremely bright. When one of the helium nuclei collides with the nucleus of another atom, the result is similar to one billiard ball hitting another, but usually it shoots through 400,000 atoms without striking a nucleus.

A motion-picture camera can be mounted directly above the top of the cylinder and arranged to operate in synchronism with the movements of the piston so as to photograph each series of flights as it occurs. It is interesting to note that out of 30,000 tracks photographed, only one indicated a nearly direct collision between a helium nucleus and the nucleus of another atom. By measuring the angles of incidence and deflection shown in such a collision, it is possible to compute the diameter of the atom nucleus involved.

## SHIP-LOADING METHODS IN MANCHURIAN PORTS

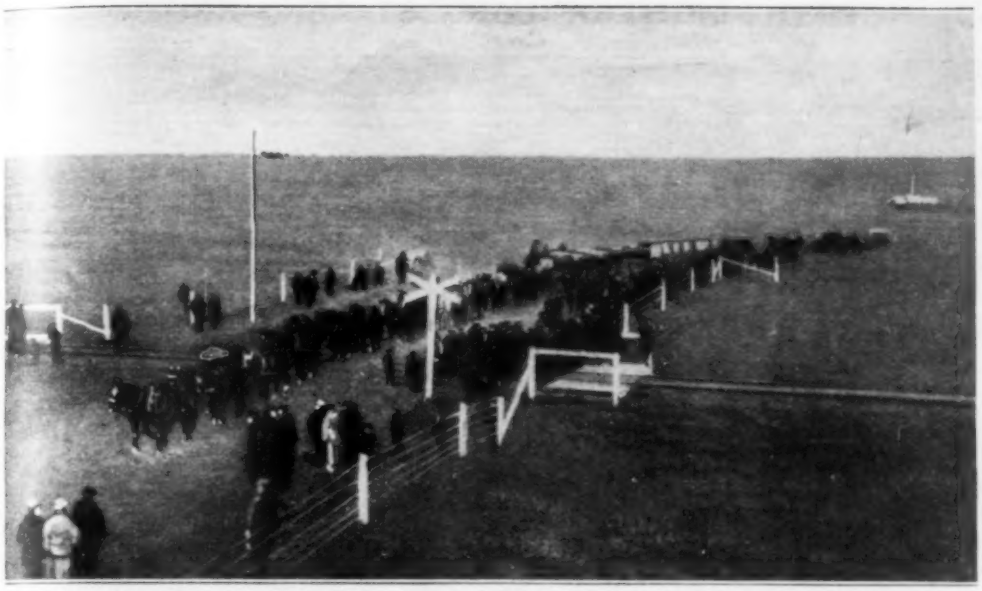
American sailors hail with joy the entry of their vessels into Manchurian ports. There is no work for them at Dairen, the ocean terminus of the South Manchurian Railway, situated 28 miles east of Port Arthur, and full shore leave is allowed. Native coolies, working for 20 cents a day, load and unload the ships. The automatic conveying machinery on board the American vessels making this harbor is never uncovered while in port, because coolies perform the labor more cheaply.

There is no mechanical unloading equipment of any sort at the Dairen docks. At the rush time of the year, which is summer, 16,000 coolies are employed in stevedoring pursuits at the busy port. One of the most important articles of export is linseed, which is brought by mule team or train to the docks. One sack or box at a time is carried by each coolie. Checking is done with sticks. When a coolie picks up a parcel and places it on his shoulder, he is given a wooden stick about the size of a lead pencil. At the end of his journey, the coolie deposits his burden and gives the tally stick to another checker. By counting the sticks at the end of the day, the exact number of sacks that have been loaded or unloaded is known.



Scenes at the Port of Dairen, Manchuria: The Native at the Left is Receiving a Tally Stick from the Checker, Who Keeps Count of the Number of Sacks or Boxes Stowed. Right: Coolies Boarding the Ship

Linseed, One of the More Important Exports, is Often Brought to the Docks by Mule Team. From the Carts the Sacks are Stacked in Piles and Finally Carried Aboard by Native Stevedores



Team of 20 Horses and 10 Mules, Hauling a Wagon Train Loaded with More than 1,000 Bushels of Wheat, and Driven by Only One Man, en Route to Vulcan, Alberta, amidst Interested Onlookers

## TEAM OF 30 ANIMALS HAUL HEAVY WHEAT LOAD

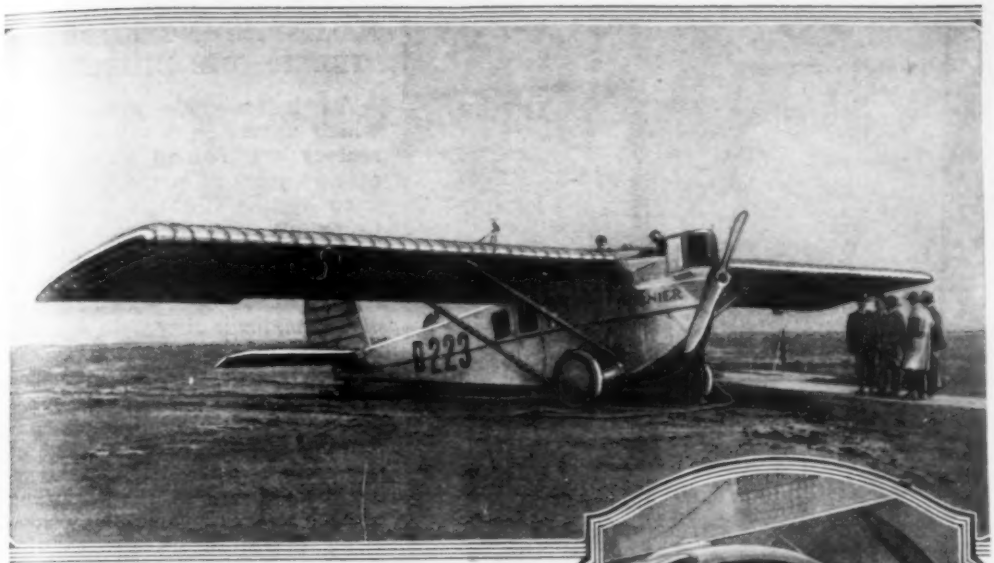
Driving single-handed a team of 20 horses and 10 mules, hitched to a wagon train loaded with more than 1,000 bushels of wheat, Ralph Morehouse, of Alberta, has established what is said to be a record in western Canada. The trip was made recently over a 22-mile stretch from his ranch near Buffalo Hills to a grain elevator at Vulcan, Alta., where, without unhitching any of the animals, the entire load was disposed of in 1 hour 17 minutes. In turning corners, Morehouse, ignoring the leading teams, swung the hind teams over the pulling cable and started them in the proper direction. These animals would then pull the lead teams until they, too, were headed in the direction desired. About 2,000 persons gathered to watch the performance.

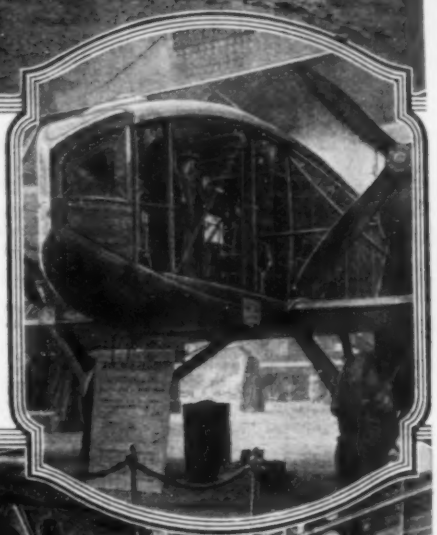
The Wagon Train Entering Vulcan: In Turning the Corners Encountered from This Point On, the Driver Swung the Hind Teams over the Hauling Cable, and Forced These Teams to Pull the Other Animals Until They, Too, were Headed in the Direction Desired

# TEST FLIGHT OF LARGEST AERO ENGINE

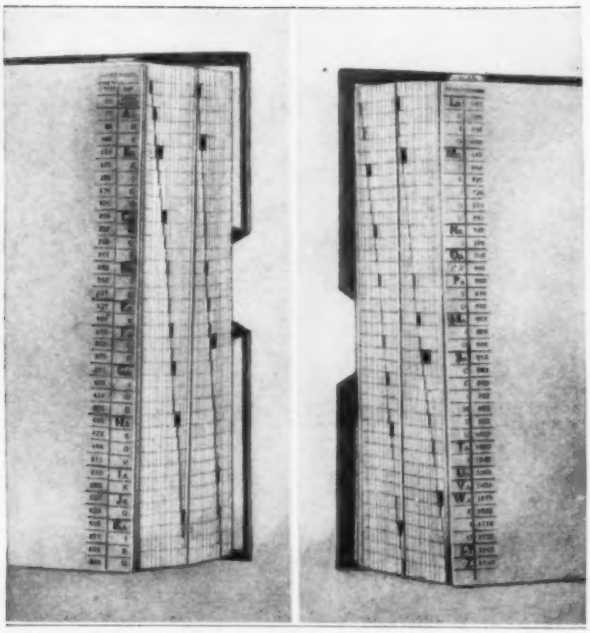
ABOVE is shown the "Napier Cub," a large bombing plane and the biggest single-engined machine ever built, on the occasion of its official test in the air at the Avro Aerodrome, Southampton, Eng. Below is a group of officials, including Air Vice-Marshal Sir Geoffrey Salmond, Director of Research; A. V. Roe, the designer, and H. T. Vane, of the Napier Company, inspecting the 1,000-horsepower engine. This is the largest motor ever built for airplane purposes, and its future performance will be watched with considerable interest.

# LARGE AIR LINERS EXHIBITED IN EUROPE





AT the present time there is a good deal of activity along the lines of developing safe and comfortable airplanes for the established and contemplated passenger routes in Europe. Above is a picture of the first German passenger plane that has arrived in England since the war, shown soon after landing near London, after a flight from Berlin. It is a large all-metal monoplane, and this was a trial trip for a permanent service between the two countries. At the right can be seen a portion of the cabin and one of the propellers of the Breguet "Leviathan," a giant commercial plane which was exhibited at a recent aero show in Paris. The "Leviathan" is equipped with the comforts of an overland train. The interior of a giant passenger airplane exhibited at the show, is shown below. The apparent passengers and attendants are really wax figures, placed in the cabin to give an idea of the comfort and security that a modern air liner affords.



Left and Right are Shown the Front and Rear Key Pages of the Index-Guide System Which has been Proposed for Use with the Telephone Directories of Large Cities

## NAME-FINDING GUIDE FOR TELEPHONE DIRECTORY

An index-guide system with which names in a telephone directory are found much more quickly than at present is being tried by the Chicago Telephone Company. At the front of the book is a page having printed in a vertical column along its outer edge a series of letters and subdivisions, beginning with A at the top and running to Ku at the bottom; while a page at the back is printed with the rest of the alphabet similarly subdivided. Extending across the front edge of the book are parallel lines marking these divisions, the beginning of each letter and its subdivisions being indicated by special vertical marks. To find the name Harris, for example, the finger is placed at "Ha" in the vertical column, run along the parallel lines to the special mark, and the book opened at that place.

## COWLITZ BRIDGE COLLAPSE FATAL TO MANY

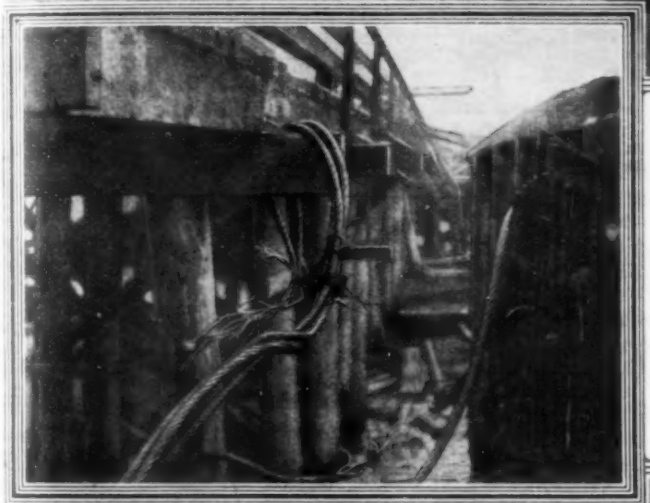
The folly of persisting in the use of a bridge after it was known to be unsafe had a demonstration at Kelso, Wash., when a bridge, built in 1907 and known to be weak, fell into the turbulent water of the Cowlitz River, carrying at least 100 people and 10 automobiles with it. The exact number who went down will never be known, and it is likely that the loss of life, at least 25, will remain only an estimate, as it is expected that comparatively few of the bodies will be recovered.

The bridge crashed at 5 o'clock in the afternoon in the early darkness, when a tie cable, anchoring one of the great steel cables at the east end of the bridge, parted without warning. With the screech of metal racing through the pulleys of the towers, the cable snapped out over the river. The west span wavered and leaned far out over the river, where the current caught it and with a single wrench dragged towers and drawspans into the stream.

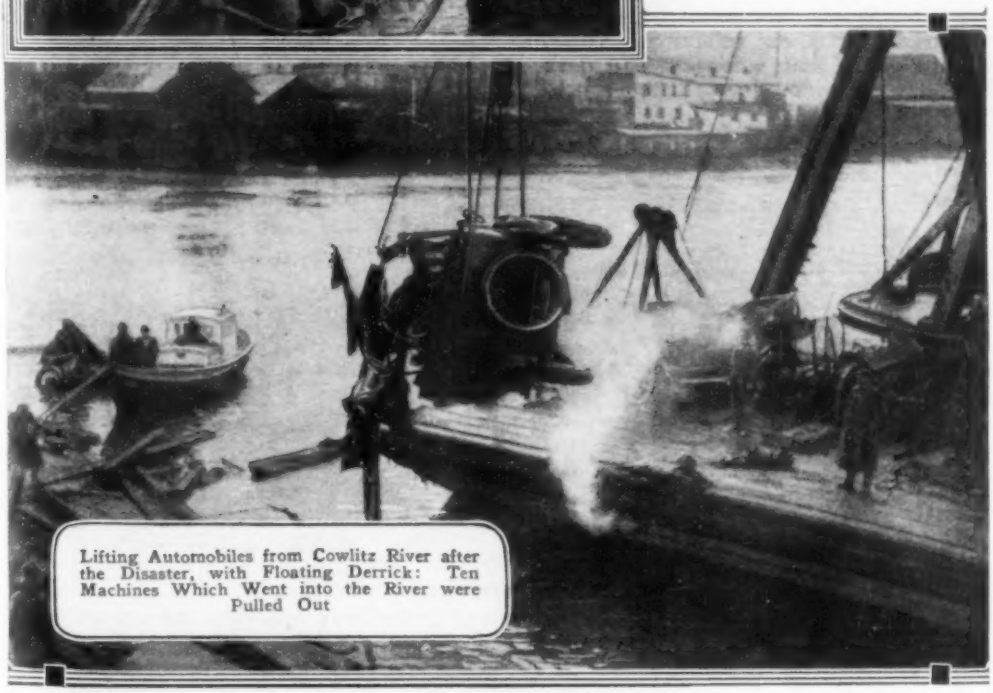
Kelso is an industrial town in the lumber district. Near by, on the opposite side of the Cowlitz, a great lumber company is establishing another town to be known as Longview. The disaster occurred just after the day's operations had ended at Longview and hundreds were hurrying homeward to Kelso, accounting for the heavy load on the bridge at the time. Those close to the ends of the bridge felt it begin to fall and scrambled to safety. Most of those on the bridge, however, were plunged into the river. There were heroic rescues, and many succeeded in clinging to the wreckage until help reached them.

The day after the collapse, rescue crews pulled apart the tangled timbers and cables and hoisted out the automobiles, but failed to find the body of a single victim. All had been swept away by the swift current. The junction of the Cowlitz River with the Columbia is just two miles below Kelso, so it is likely that most of the victims were carried into the Columbia and, probably, to sea.

The work of clearing out the débris was facilitated by the use of a new bridge, not yet completed, a short distance downstream from the old one. This structure caught much of the wreckage, and power hoists were used to lift from the river automobiles and other salvage. Within perhaps two months, the new bridge would have been ready and the old one abandoned.



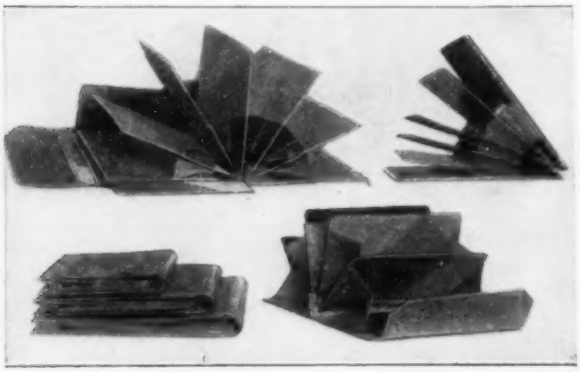
Above: Collapsed Bridge over Cowlitz River, Oregon, Which Fell from Breaking of Cable, and the Ruined Piers Which Supported It. At the Extreme Right is Shown the New Bridge, Some Distance Downstream, and Wreckage Thrown against It. This New Bridge Helped in Rescue Work. Left: Tie Cable Used in Anchoring a Large Cable at One End, and Its Broken Strands, Which Parted and Caused the Disaster. It was Pulled Out of the Wreckage the Day After and Found to Be Responsible for the Falling of the Old Bridge, Which had been Condemned, But Was Still in Use While the New One Was under Construction



Lifting Automobiles from Cowlitz River after the Disaster, with Floating Derrick: Ten Machines Which Went into the River were Pulled Out

## FOLDING PORTFOLIO OPENS AND CLOSES LIKE FAN

Instant accessibility is claimed to be the outstanding feature of a new portfolio which can be carried about or used as a file on the corner of the desk. The case is 9 inches wide, and the partitions are connected with plaited cloth like the blades of a fan, and pivot at the back. One style has a leather flap which snaps over the edges, preventing the contents from falling out when carried, while on the desk this piece is slipped under and out of the way. The portfolio is particularly convenient for sorting small clippings, cartons, or miscellaneous data required for quick reference. Another advantage is that when on the desk it conceals contents of a private nature.



Several Views of Filing Portfolio, the Partitions of Which are Connected with Cloth Plaited like the Blades of a Fan, and Pivot at the Back

## MINER'S LAMP ELIMINATES SPARKING TROUBLES

In coal-mining operations, dependable miners' lamps are extremely important. The carbide type carries a gear-wheel for sparking a flint and thereby igniting the gas, but working conditions have made it a source of trouble to the miner. If his hands are wet or greasy, the moisture or oil may be carried to the flint by the gear wheel, spoiling its action. A new lamp avoids the troublesome sparking wheel by using a snap light. Moisture and oil have no effect, and even gloves do not interfere with lighting the lamp. The inventor has also put a small plunger at the base of the water outlet, for pushing away the sludge which tends to form there.

Left: Lamp in Miner's Hand. Right: Close-Up of Snap Lighter

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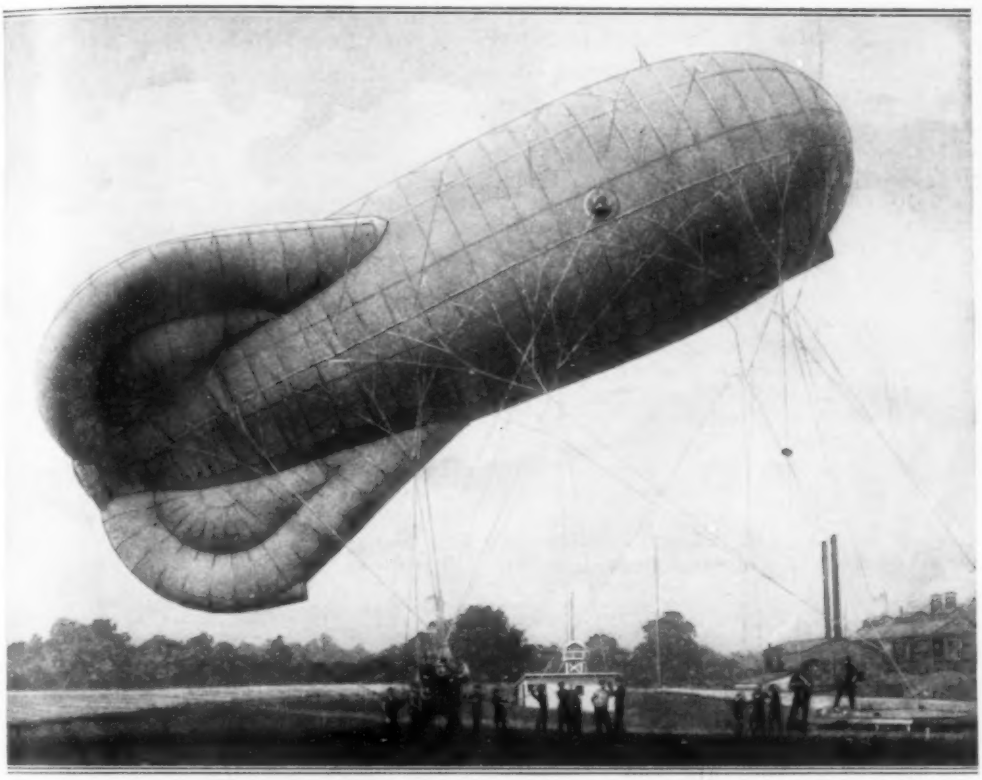
## PLAY TENNIS ON SKATES IN ILLINOIS

THE thrills of ice skating and tennis have been combined by outdoor enthusiasts of a club near Glencoe, Ill. Mapping off a court and erecting a net on an ice pond near by, the members have inaugurated tennis on skates—an adaptation of the old sport that, according to some, furnishes even more opportunity for spectacular playing and excitement. It is expected that the idea will be imitated by many clubs throughout the country.



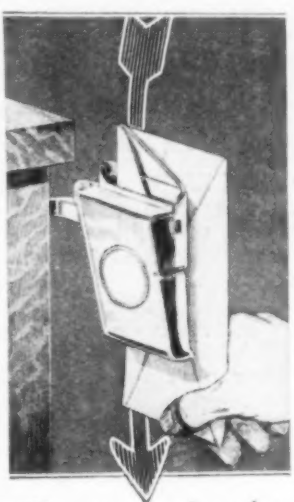
Captive Balloon Equipped for Protection against Lightning and Static Electricity: The Cone-Shaped Discharger on the Topmost Part Connects, through Flat Braided Copper-Wire Conductors around the Bag, to the Haul-Down Cables Which are Grounded to an Iron Pipe

## DEVICE PROTECTS BALLOONS AGAINST LIGHTNING

In order to afford protection against lightning and the static electricity of the clouds, for captive balloons and kite balloons used in securing meteorological data, a radio engineer of the United States Navy Department has developed a new apparatus. The discharging element is a vertical conductor located on the topmost part of the balloon and connected with suitable conductors to the down-haul cables, which are grounded to an iron pipe driven into the ground. To prevent the balloon circuits from being affected by the atmospheric discharge, a carbon resistor of 5,000 ohms is connected in series with the cables. The discharger consists of a leather cone with a copper tip fastened to it by means of copper rivets, and the conductors around the body of the balloon are of flat braided copper. It is said that one balloon equipped with this rig will lend considerable protection to a number of others in its immediate vicinity. This protective system has already been installed on eight balloons.

## AUTOMATIC ENVELOPE SEALER WITH NO MOVING PARTS

Automatic in action, a new envelope sealer is operated by simply passing the envelope through the sealer with a single movement of one hand. The envelope flap is lifted, the gum moistened, and the envelope sealed without any hand pressure. The sealer can be screwed to a desk or table. It has a reservoir for water and a moistening pad that is easily replaced or removed for the purpose of cleaning.



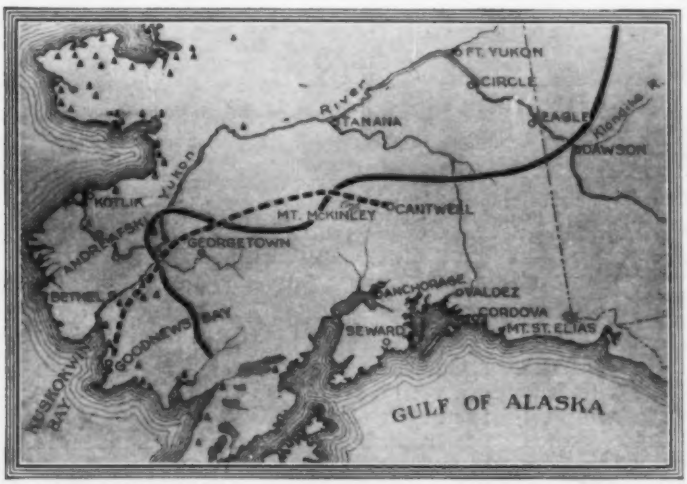
# WHEN THE CARIBOU TREK

## Migrating Herds of Wild Caribou Delay Alaskan River Steamers and Interfere with Domesticated Reindeer—Government Drives Latter to New Feeding Grounds, 1,100 Miles Away

BY STRATFORD F. CORBETT

IN the Yukon district of Canada, and in Alaska, are thousands upon thousands of caribou, large, splendid animals, defiant of man's efforts to domesticate them. So many of them are there, in fact, that herds swimming the Yukon have seriously interfered with the progress of river steamers en route to Dawson City. Captains have found that, until they have passed, it is useless to attempt going ahead—even though the delay might be a matter of hours.

During these stops, many of the animals are shot by passengers, for a caribou in water is quite helpless. But in spite of relentless hunting by white man and Eskimo alike, the vast herds still continue to be the largest evidences of wild-animal life in existence in the Far North. As they trek, each year, through forest and mountain stream on their long journey to new feeding grounds, they present a strange and magnificent spectacle.




The Dotted Line Indicates the Route Taken in Driving the Reindeer from Goodnews Bay to Cantwell, While the Black Line Shows the Path of the Caribou Migrations. The Black Pyramids Represent Reindeer Stations

Another great migration of a slightly different nature, but throwing interesting sidelights on the habits of the caribou, recently took place under the direction of the Alaskan division of the Bureau of Education. The herd, in this case, was a band of 1,500 reindeer owned by the government, and the route lay from Goodnews Bay, on the Bering Sea, to Cantwell Station, in the Broad Pass District.

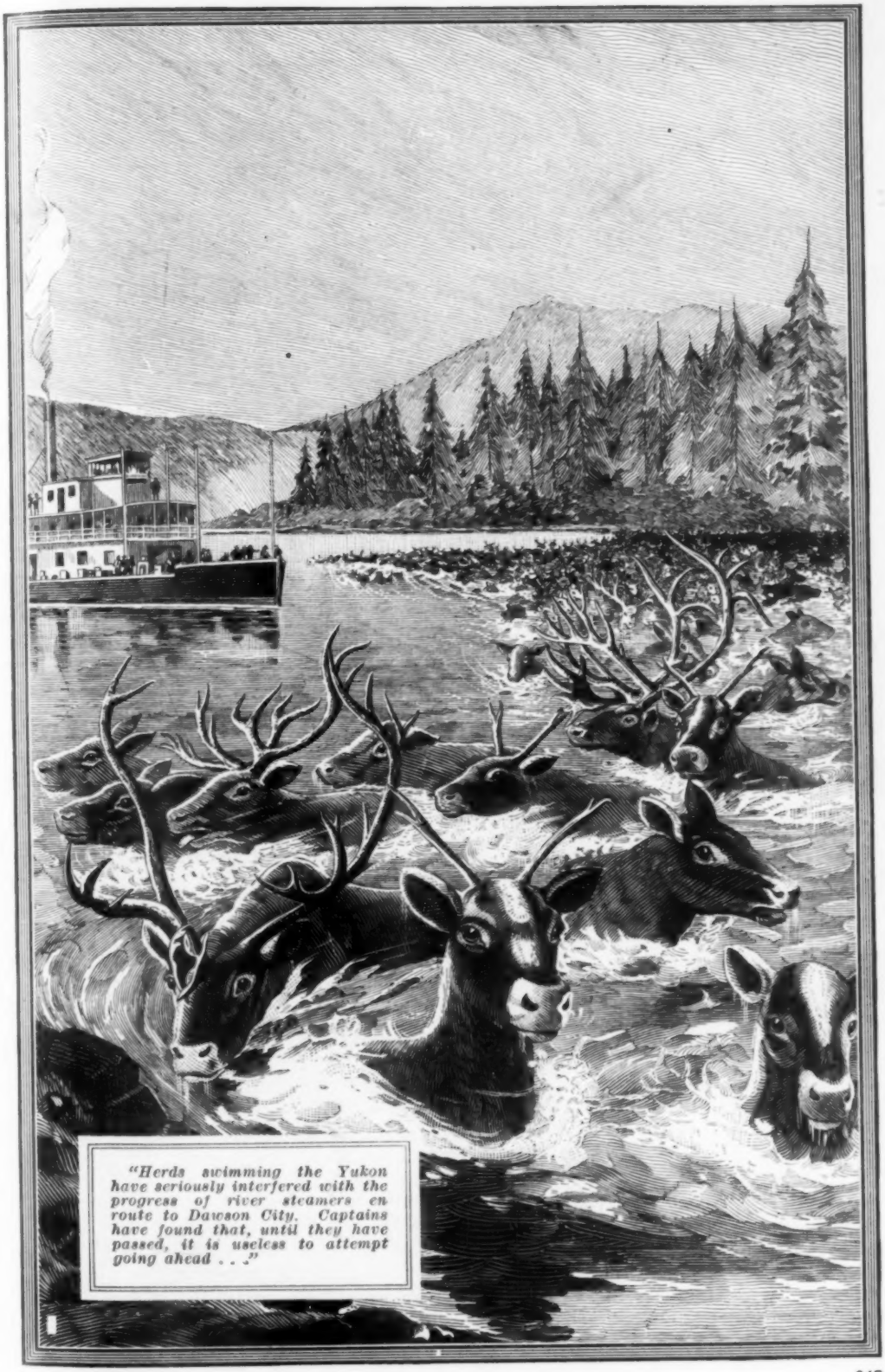
It is interesting to note that one of the principal reasons for this move was to take the reindeer herd, considered one of the finest in Alaska, out of the vicinity of the annual caribou migrations. The reindeer is closely related to the caribou, and, if permitted, they will run together and interbreed. The offspring of this union, however, is not a reindeer, but a caribou with all the nomadic instinct of its prototype. Hence the precaution of the government agency.

The drive was over snowy tundra and mountainland, the herders native Eskimo. Near Bethel, on the Kuskokwin River, the first rest was made. Then the reindeer, foraging as they went, were driven leisurely to the foothills of the McKinley Mountains, where another halt was called. After four months, they continued to Mt. McKinley Park and thence on to Cantwell Station.

It was while resting near Bethel that one of the most exciting incidents of the journey occurred. Early on morning, a passing herd of caribou was sighted. In a few minutes the entire herd of reindeer became nervous, restive, and eager to break away. The herders, working heroically, ran here and there endeavoring to calm the animals and distract their attention. Yet, in spite of their best efforts, a hundred or more of the deer succeeded in breaking away and joining their wilder brothers.

Then followed a strenuous chase across country, in which the guards, assisted by men from the reindeer station in the vicinity, recovered all but fifteen of the truant deer. Throughout the rest of the drive, the greatest difficulty encountered was in keeping the herd intact. That more were not lost was due entirely to the skill and watchfulness of the herders.

Men were first employed for work of this kind in 1892, when the Federal government imported 80 reindeer from Siberia. Introduced primarily to take the



*"Herds swimming the Yukon have seriously interfered with the progress of river steamers en route to Dawson City. Captains have found that, until they have passed, it is useless to attempt going ahead . . ."*

The Reindeer Herd as It Appeared en Route to Cantwell: The Drive was Made Leisurely So the Animals could Forage for Their Food as They Traveled

Left: The Summer Home of a Government Herder: The Boy with the Lasso in His Hand is Practicing, That He, Too, may Some Day Become a "Reindeer Man"

place of the depleted wild-game resources of the territory, the reindeer has now become an economic factor in the development of Alaska. It is well known that to the native the reindeer has long symbolized food, clothing, shelter, and a means of transportation.

Now, with the aid of the white man, there is being developed the reindeer industry, the most tangible evidence of which is found, perhaps, in the fact that reindeer meat can now be purchased in many of the larger cities of the Pacific coast. It was principally to make the markets of the United States more accessible to Alaskan reindeer men that the government established the large herd in the Broad Pass country.

In the expectation that it will be possible to slaughter the male reindeer of this and other herds, meat-chilling plants are being constructed at various points in Alaska, including Cantwell Station in the Broad Pass district, so that the herds can be driven to these plants, the meat prepared for shipment, and carried to the States in refrigerator vessels.

An indication of what the future may develop, is to be found in the reports of privately operated refrigerator plants, which show that during the winter there were shipped 6,200 carcasses, as compared with 1,800 in the preceding year.

The most serious, perhaps the only serious, menace to successful reindeer raising are migrating caribou herds, and so it is that government agents are wont to exclaim, "When the caribou treks, watch out!"

## ADOPT ZONING SYSTEMS IN SMALLER TOWNS

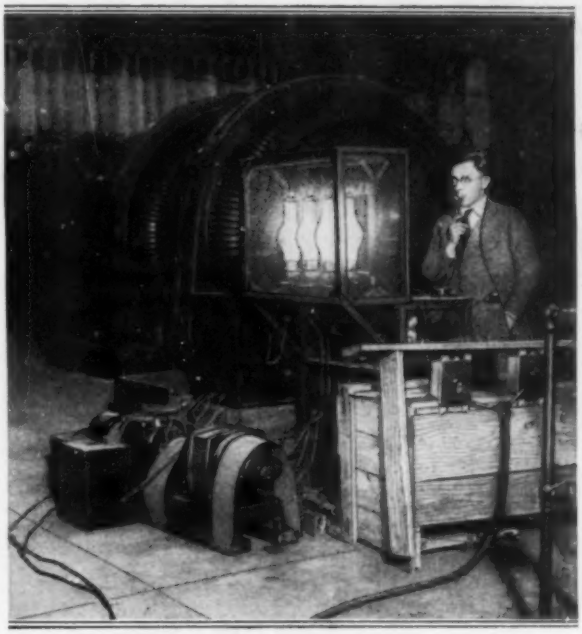
Many of the country's smaller towns and villages are adopting zoning systems, according to the Department of Commerce. In the entire country 109 cities, towns, and villages were zoned on Jan. 1, 1923, as compared with 55 for the same day last year. Of those zoned in 1922 there were 14 towns with populations of from 5,000 to 10,000, while 12 had 5,000 inhabitants or less. The state of New Jersey ranks highest in the number of places zoned, New York being second, and California third.

¶A typesetting machine with a special attachment by which copy may be set by radio is reported to have been invented by a French engineer.

## SECRET CONVERSATIONS BY RADIO "SUPERPHONE"

The apparently impossible feat of transmitting conversation while confining it to the speaker and the person for whom it is intended has been accomplished recently in Washington. It was done by a combination of the "superphone," the invention of Maj. Gen. George C. Squier, chief signal officer of the army, and the principle of using electric light or telegraph wires, as in the receiving station at Chatham, Cape Cod.

"Wired wireless" and high-frequency alternating current traversing telegraph or light wires, are used in connection with an ordinary microphone at the transmitting end. The message is picked up by radio instruments and directed into a telephone receiver at the other end. A number of conversations may be carried on simultaneously over the same wires. Where secrecy is important, as in military or business matters, the invention's value is apparent.



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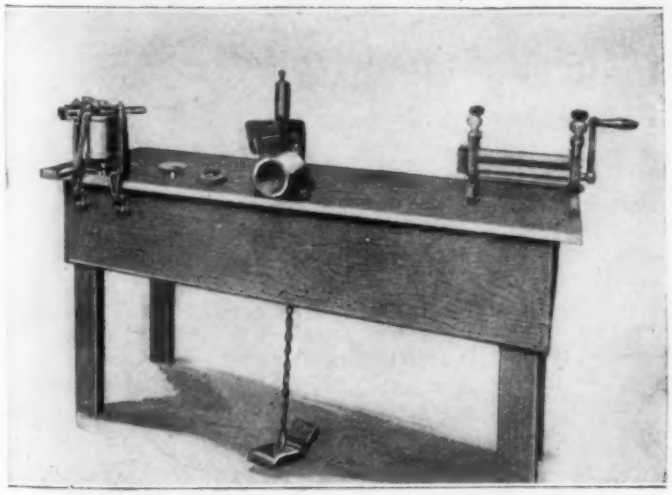
By Combining the "Superphone" with "Wired Wireless," the Operator is Talking from the Georgetown Power Station to the Bureau of Standards in Washington, Five Miles Away

## TIN CANS MADE AT HOME WITH SIMPLE OUTFIT

Among the interesting devices lately put on the market, is one for making tin cans at home. It consists of three small machines that are easily fastened to any workbench. A piece of tin, previously cut to size and shape, is formed by the first machine into a cylinder which is next put into the "seamer," where it is held by a glass clamp, while the ⅛-inch lap joint is sweated together with solder and a hand soldering copper. The third machine is used for flanging the ends of the cylinder and in crimping on the circular pieces of tin that form the bottom and top of the can. This equipment is comparatively inexpensive, and was developed to meet an insistent demand from localities where the cost of a can factory is not warranted or to which the transportation charges on empty cans are excessively high.

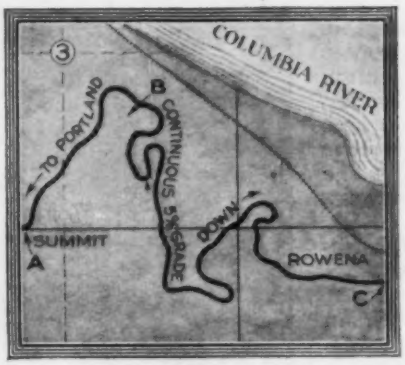


With This Simple Device, Tin Cans may be Made and Soldered, Saving the High Cost of Shipping. From Left to Right, the Machines Are the Crimper, That Puts on the Ends, the "Seamer," and the Shaper

# NEW LOOPS IN COLUMBIA RIVER HIGHWAY

By HORACE E. THOMAS

ONE of the most spectacular sections of road in the United States was completed recently as a portion of the upper Columbia River Highway in Oregon. It is known as the Rowena Loops and is quite as striking as any of the older sections of this great highway which wind down the gorge of the Columbia River from the plains of eastern Oregon to the Pacific Ocean, piercing the Cascade Mountains at the only place where this lofty barrier is broken.

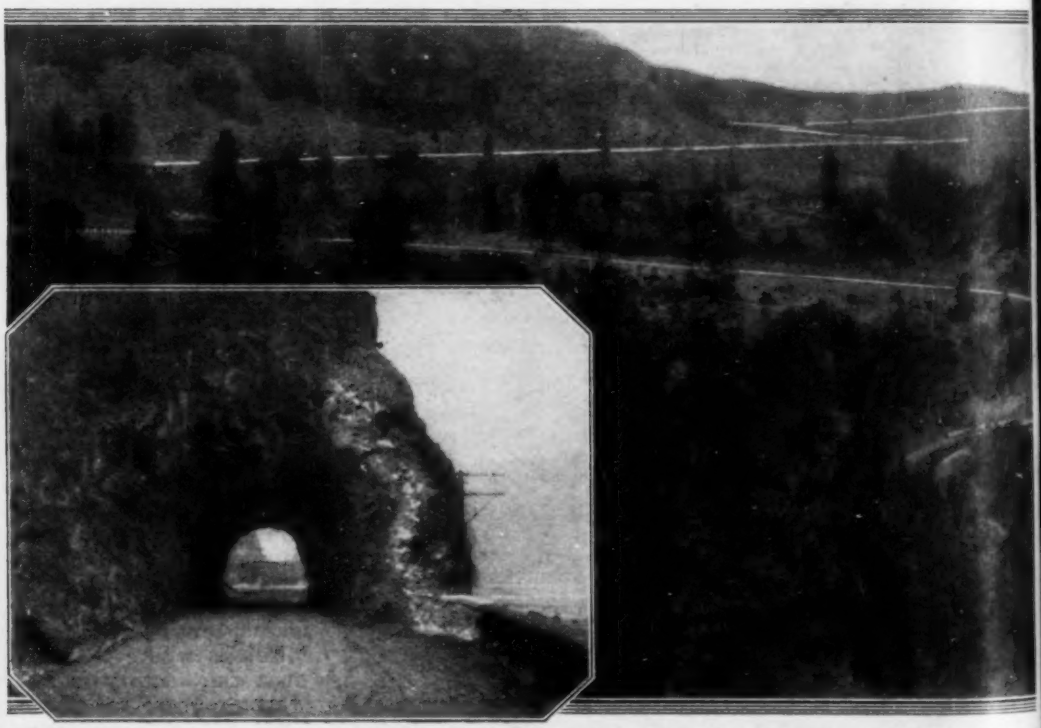



From the Summit "A," 750 Feet above Sea Level, to "B," a Distance of 2,500 Feet, the Grade Averages Three per Cent, and from "B," at an Elevation of 680 Feet, the Road Drops to 130 Feet at "C"

In addition to its scenic beauty, the Columbia River Highway is becoming of national importance as a link in one of the great transcontinental routes. The Columbia Highway itself now extends from Pendleton to the sea, a distance of 340 miles, of which 219 miles is continuous hard-surface pavement and the rest macadam. At Pendleton it connects with the Old Oregon Trail, a road which follows the route taken by the ox teams that took the early pioneers into the West and which joins the Lincoln Highway at Salt Lake City.

For 90 miles east from Portland the Columbia River Highway penetrates the Cascade Range. Rowena Loops is on the eastern side of the mountains, beyond Hood River and between Mosier and Rowena. It was completed and paved a few months ago.

The construction of Rowena Loops was a dangerous and exacting engineering feat. The roadway is cut in the side of a rock cliff with precipitous sides dropping to the Columbia



This Panorama of the Loops Gives a Good Idea of the Beauty of the Surrounding Country, and the Care Which has Been Used in Building the Highway, the Entrance to One being Built of Stone. The Cost of Paving the Section About Rowena Was Approximately $185,000, and the Cost of Paving the Section About Mosier Was $90,000

Near the Top of the Rowena Loops, Showing How the Road has been Cut through Solid Rock and Made to Wind about the Edge of the Cliff: Note, Too, the White Fence Guards Which are Built at Curves in the Highway and Other Possible Points of Danger

been Taken in Keeping the Average Grade of the Road below Five per Cent. The Complete Cost of the Grading Inserted at the Left and Right Are Picturesque Views of Two Tunnels on the While the Other Is Entirely without Artificial Support

River hundreds of feet below. The view of the Columbia, which is visible for many miles in either direction, is one of entrancing beauty, but at places the traveler is likely to be more concerned with the deep cañon into which he would plunge if his machine left the highway. There is no real danger, though, for the construction is of the most permanent kind, and where it skirts the edge of the cliff, a low stone barrier protects the autoist.

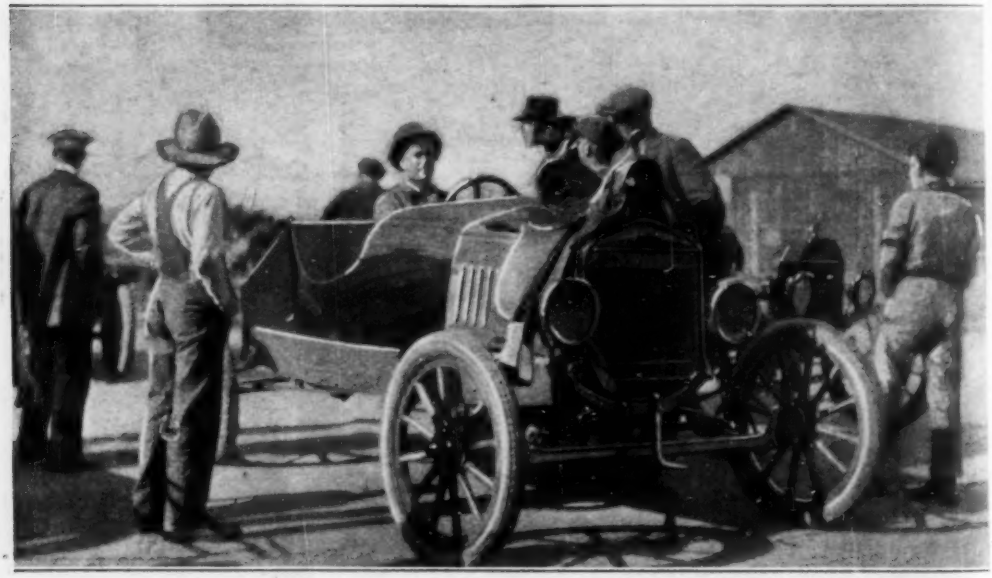
Rowena Loops covers a distance of 2.75 miles, and in that distance rises from an elevation of 130 feet to 750 feet above sea level. Skillful engineering has kept the grade to a minimum, so that it averages about three per cent, with none of it more than five per cent. In most places the roadbed was cut from solid rock, as is indicated by the fact that of a total of 138,000 cubic yards of excavation, 105,000 was rock. The grading alone cost over 180,000 dollars.

## LORD'S PRAYER SET ON PICA FACE WITH MONOTYPE

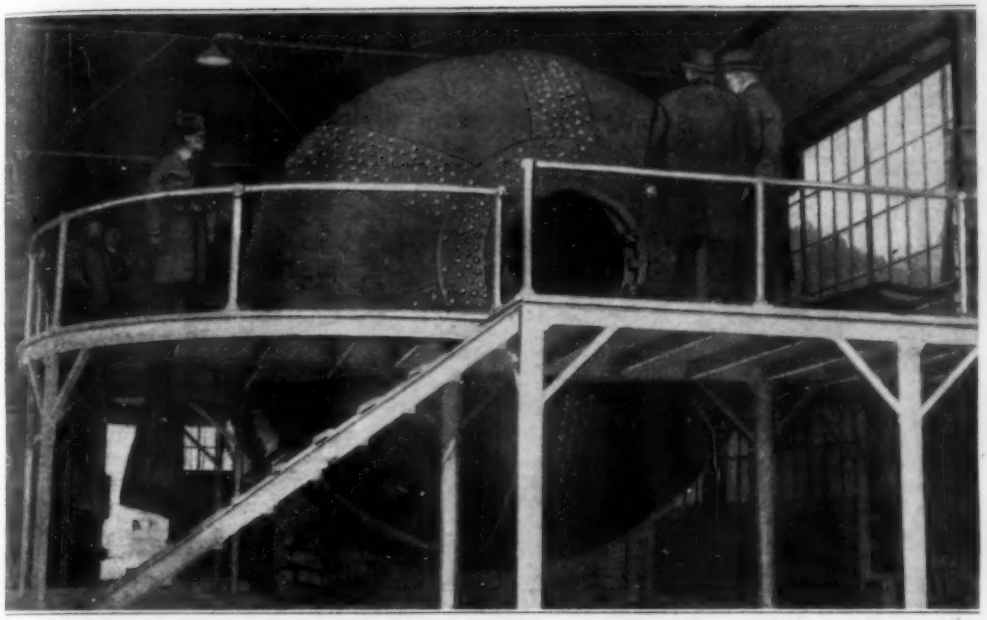
The Lord's Prayer has been set on a piece of pica type in a box one-sixth of an inch square with a monotype machine in a Philadelphia shop. The inscription consists of 225 capitals, four commas, four periods, one semicolon, and two dashes. The letters are .006 of an inch high. Duplicates were made and distributed by the company, but because of the delicacy of the type no attempt was made to print the inscription.

## AUTO DISPLACES BRONCHO IN RIDING TEST

In the one-time wild and woolly West, riding the bucking automobile may give way to the honored test of skill in horsemanship—riding the bucking broncho. For it has been found that a seat on the radiator of a small auto with the wheels off center gives all the thrills of a broncho-busting contest, with an element of novelty. In a recent performance of this sort in California, a saddle was placed on the hood, and a prize of $25 offered for riding two blocks. At 10 miles an hour, the rider had difficulty; at 15 miles, he went off. With the hub of each of the wheels of the car removed and reset 2 inches off center, it gives a realistic imitation of the bucking broncho, though, having no reins, the rider is, perhaps, even more helpless than on the "orneriest" animal.



Small Automobile Altered to Provide Imitation Ride on Bucking Broncho: All Four Wheel Hubs are Set Two Inches off Center and the "Cowboy" Takes His Seat in the Saddle on the Hood. One Rider was Thrown When the Car was Driven at 15 Miles an Hour



End of Compressed-Air Tank Inclosing Wind Tunnel Used in Testing Models of Airplanes: The Opening Shown is Closed by a Door Weighing Two Tons, Opening Inward. The Tank Operates under an Average Pressure of 300 Pounds per Square Inch

## NEW WIND TUNNEL IN HUGE COMPRESSED-AIR TANK

The wind tunnel recently completed for experimental work by the National Advisory Committee of Aeronautics, will operate in the greatest compressed-air tank yet built. The 5-foot diameter tunnel is inclosed within a steel tank, 15 feet in diameter and 34 feet long. The walls of the cylinder, which is designed for an average working pressure of 300 pounds per square inch, are made of plates 2¼ inches thick. At the ends and along one side are platforms and observation windows from which may be viewed the instruments in the test chamber. A fan located inside the chamber can be regulated from the outside to give the desired wind velocity. Test of models, which may have a span up to 2 feet, will yield data comparable to those from a full-sized airplane by eliminating the "scale effect" that is common to wind tunnels.

## AUTOMATIC MACHINE HELPS IN BLOOD-CELL COUNT

As a help to physicians in the blood analysis which counts for so much in modern diagnosis, a Chicago doctor has invented a machine to register the count of blood cells. In making a blood analysis, there are five species of cells of which a count is made. On the rectangular case of the machine are five keys for recording these five species. Two extra tabulator keys record the cells not classified by these five. These are connected with a

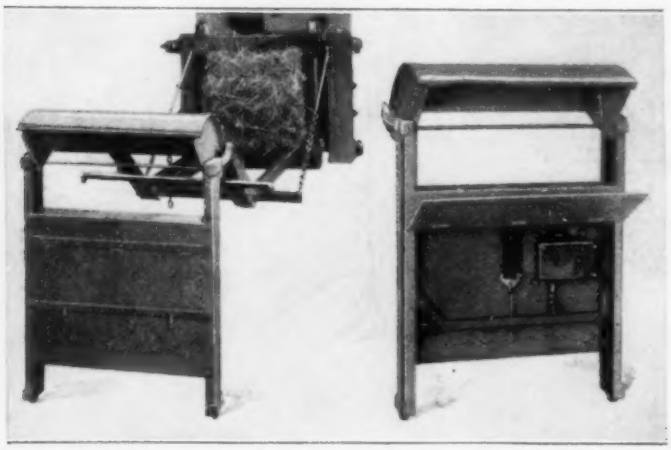
Automatic Machine Invented by Chicago Physician to Count Cells in Blood Analysis: With One Hand He Operates Keys for Five Cell Species

series of gears and numbered registering disks. An automatic bell notifies the operator when 100 cells have been counted.

¶Canadian waterfalls supplied 3,000,000 horsepower of electrical energy in 1922, Ontario furnishing 1,300,000 horsepower, the most for any one province. There is a total of $620,658,731 invested in this development.

## LITTLE MACHINE WEIGHS AND COUNTS HAY BALES

After a day's work in baling hay, the owner of a hay press need only look at



Left: Bale of Hay Coming from Press in Background to be Weighed and Counted. Right: Front of Machine Which Receives It from the Press and Registers the Weight and Number

the recorder of a new automatic weighing and counting machine to know how many bales his machine has turned out and their weight. As the bales come out of the press, they fall upon the device, weigh and count themselves, and then tumble off, ready to be loaded. It is light, takes little space, and may be stowed away on the press when not in use, and saves considerable time.

## BENEFITS OF OWNING A HOME SHOWN BY PHOTOPLAY

A five-reel motion picture depicting in story form the many benefits derived from owning a home, and using an actual home in process of construction as its principal setting, is being prepared by a film company for production by community centers, clubs, churches, and similar mediums. The story is woven about the life of a young married couple who are first shown living in an apartment building where they experience continual annoyances. Finally, they decide to build a home of their own, and the film then pictures the consultations with the architect, the laying of the foundation, installation of the plumbing, and various other steps necessary for the realization of their plans.

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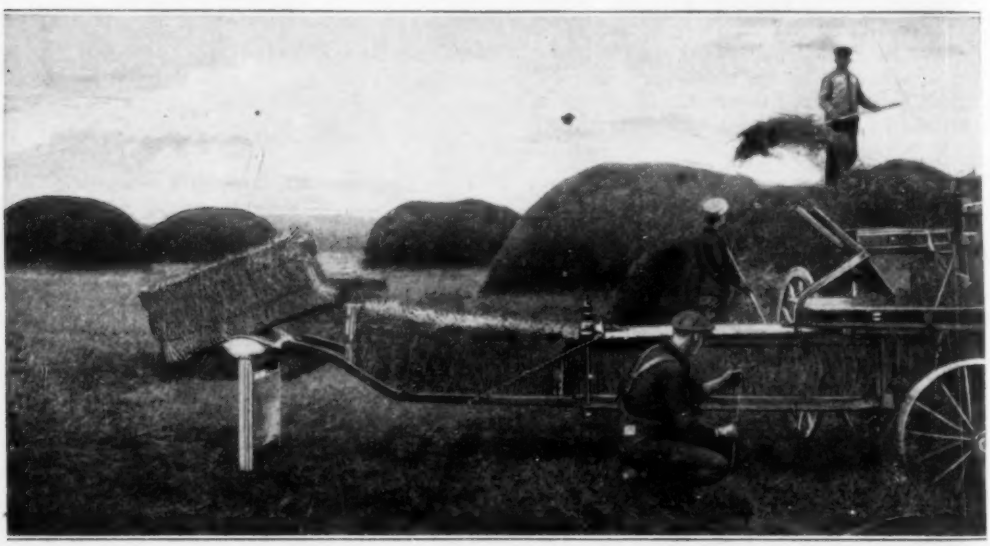
¶A steel cast, enameled in black on white, to represent the ideal form of the Holstein cow, has been made by a national association interested in dairying, and replicas are to be sent to the various local chapters of the organization.



Hay-Baling Press at Work in the Field: As the Bales are Pushed from the Press Proper, They Pass over the Automatic Weighing Apparatus, Attached at the End of the Bale Conveyor, and are Weighed and Counted

Members of the Expedition are Shown Here Conversing with Natives about the Difficulties Which might be Encountered. Though Many of the Tribes Were Friendly, There Was Also Danger of being Attacked by One of the Numerous Bands of Desert Robbers

# MOTOR CARS CROSS SAHARA DESERT

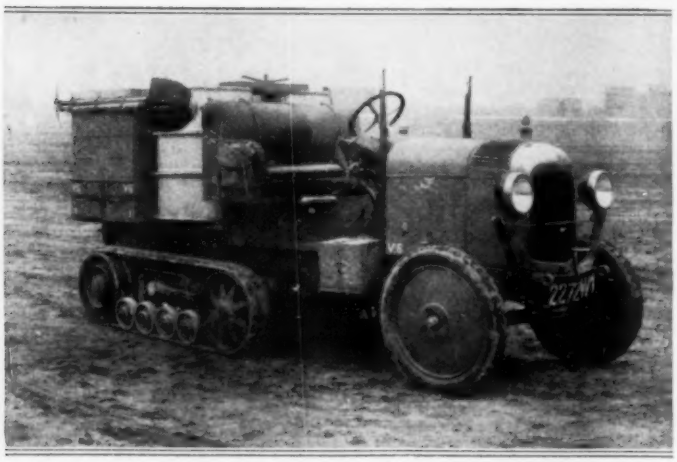
By CLEVELAND GAINES

FIVE motor cars, all equipped with special endless-tread drives of rubber to plow through the deep sand, and some mounted with machine guns to repel anticipated attacks from desert robber bands, recently completed a journey across the Sahara Desert of approximately 2,000 miles, from Tuggurt, in Algeria, to Timbuktu, in French West Africa.

The caravan left Tuggurt on December 18, last year, but first, in order to insure a proper supply of fuel, water, and food, other cars were sent ahead as far as Insala to establish depots, while a similar outfit left Dakar in the south and approached north to a military station at Kidal. The expedition proper then set forth, arriving at Timbuktu on January 7, just 20 days later, the time being several months faster than average camel time for the same distance.

The cars had, in addition to the endless-tread arrangement, a platform at the back for holding two gasoline storage tanks. These tanks each had a capacity of 35 gallons. Water tanks containing 13 gallons, and aluminum chests filled with ammunition, food, tools, and other necessities, were also carried. A tent for each car, and a motion-picture camera outfit completed the equipment. Trial tests had shown that the sand had no effect on the lubrication or operation of the motor, nor were any modifications in the radiator or any other part of the machine found necessary. The drive itself consisted of two wheels, several feet apart, around which was stretched the rubber belt, with smaller intermediate wheels between the two helping to distribute the load.

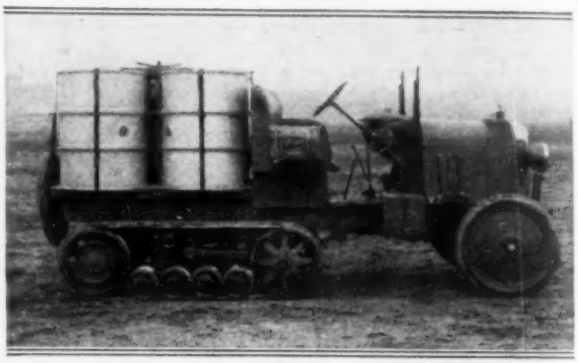
The Figures Represent the Approximate Distances in Miles between the Various Stations along the Route. Some of the Regions Traversed Were Little Known to Man. This Was Particularly True of the Section between Tit and Kidal



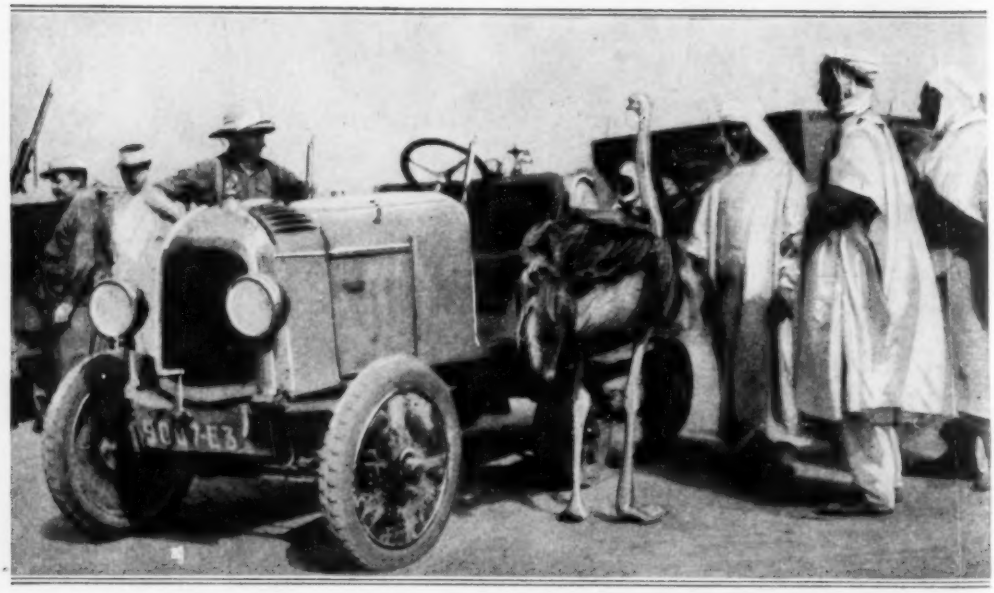
try, then for miles there is nothing but barren desert until the Ahaggar Range is reached. After that comes the "great unknown," also called the "land of thirst," and finally more sandy stretches with occasional vegetation, to Burrum on the Niger, and Timbuktu.

One of the principal reasons for the trip was to determine whether or not the cars would be practicable for desert travel, though data of a scientific nature were also collected.

Above: Fully Equipped Car of the Expedition Proper. Right: One of the Gasoline-Supply Cars Sent Ahead of the Main Party



While no part of the journey could be considered devoid of hardship, it was from the Ahaggar Mountains to Tit and Kidal that travel was especially difficult. This region is practically unknown, and the route had to be determined by compass. - Tuggurt to Wargla is a vast, sandy desert with some vegetation; from Wargla for some distance south, a somewhat similar coun-



The Natives had Seen No Car of This Description Before and Were Curious to Learn Just How It was Constructed and How It would Run through the Sand. The Little Group Shown Here Also Thought It Was Quite Proper to Bring a Pet Ostrich Along

# COMMENT AND REVIEW

[These pages were printed January 27, 1923.]

THE count of the death toll from revolvers and automobiles for 1922 is completed and rolls up the astounding total of 10,000 from pistols and revolvers, and about the same number from automobiles. In both counts many hundred, if not several thousand, who died weeks or months after the accident, and in the case of revolvers, many more who were killed and the bodies concealed and not yet found, were not included.

*Pistols and Automobiles Kill 20,000*

Following the article in this magazine on revolvers, a few months ago, I received many letters, some couched in evidently sincere but bitter terms, protesting against the article and what it proposed. In some cases, such as explorers, woodsmen, frontiersmen, and some hunters, I frankly admit a law prohibiting the manufacture and use of such small arms would unquestionably work a great hardship. Some of the protests sounded rather foolish, such as the farmer in Connecticut who must have a revolver "to defend himself against snakes, skunks, and hawks." In the case of the skunks, most of us will agree a long-range weapon would be more advisable, and when it comes to hitting snakes and hawks, most people will regard a shotgun as likely to score a larger number of hits.

The chief of police of Los Angeles seems to think guns should be freely and generally toted, but he is quite the exception among police officials, especially of large cities.

The ease of smuggling, or of making revolvers at home, was likened by many to the inefficiency of the enforcement of the 18th amendment. But this is not true. It is manifestly much easier to make "home brew," which can be done with a teakettle, than to make a revolver of sufficient accuracy to be worth having. While one undoubtedly can be homemade with a few simple tools, the output from this source would be in the ratio of about 1 revolver to 10,000 gallons of "moonshine."

Anyway, the murderous killing goes on, and is now estimated to be in the ratio of 1 murder to each 10,000 population, each year. In other words, the average risk of either being murdered or killed by auto, is 1 in each 5,000 population, yearly, or in terms of 10 years, at this same rate, your chance of being killed is 1 in 500.

If a single city of 20,000 were wiped out in an instant, the entire world would gasp; but this decimation is so regular and so diffused, few outside the immediate relatives and friends are much affected. It is almost impossible to safeguard machinery under the best conditions, and with most skillful operators, to the point of absolute safety. It seems impossible to insure that the more than 10 million drivers who operate the 10 million automobiles, shall each and all possess the mental balance, training, eyesight, judgment, and skill to preclude any loss of life. It is far, very far, from human possibility. The chief trouble rests not so much on the lack of these qualifications, necessary as they are, but rather in a selfish indifference of the great potential power they control, and the lack of thought that the least relaxation to carelessness may cause a death any minute. Even the most careful have their moments of unconscious disregard. Appeals for safety first undoubtedly are very helpful; the road signs marking grades, railroads, curves, etc., are good, and should be uniform in all states. But as men working in powder mills become careless, so men and women, boys and girls driving cars, come to think more of caution as it affects their own bodies, and less of others. The only thing which will check, for it can never wholly cure, the evil, will be greatly increased and rigidly enforced penalties for killing and maiming people, even unintentionally. The story of the chauffeur arraigned in court for running over a woman, illustrates the mental attitude of many. He pleaded he commenced sounding his horn when the woman was still some distance away. When the judge asked if he used his brake he replied, "I never thought of that, your honor."

Indianapolis proposes to submit all persons arrested for auto speeding to an insanity test, and to keep them in padded cells pending the decision. Better far to decide that point before the license is issued. And it can be done. The Yellow Cab Co., of Chicago, submits every applicant for position of driver to a test which begins with good physical health, and includes eyesight, 92-per-cent good, heart and lungs perfect, no epilepsy in family, and no insanity as far back as grandparents. The inspection is nearly three times as severe as insurance companies demand. And the company has found 5,000 men competent to qualify. Aside from all moral obligations to the public it serves, the resulting freedom from accidents amply repays all the cost of examination and investigation.

This may be taking unusual precautions, but sooner or later some such condition, though less severe, will have to be imposed upon all drivers, of both public and private cars.

NEVER in our history had anything to be sold received the urge and publicity which was put forth to dispose of Liberty bonds and war stamps. Every paper and magazine was full of display advertisements and columns of reading notices. Trainloads of printed circulars were sent broadcast, every billboard and available wall was plastered with posters, and both men and women orators spoke from theater platforms, pulpits, vehicles, and soap boxes. It was a most remarkable course in educating the masses to buy securities, in which were enlisted—chiefly voluntary—the best advertising talent in the country—which means in all the world.

*Blue-Sky Stocks*

Millions of people who never in their lives had bought a share of stock or a bond, became bondholders. The number of these is placed at 20 million. Like many other things, the second time was easier than the first, and almost before the war was over, and the appeal to buy government bonds ceased, there sprang up an army of unscrupulous schemers who took advantage of the psychological condition to market their worthless "securities." The public, having in mind and sight the fortunes which the war conditions had brought to many, almost overnight, were easy marks for plunder. Most anything which could be made to read like a get-rich-quick enterprise found willing listeners, and a ready and welcome reception. Oil and mines were the most favored subjects, and to make it easy for everybody to get in—on the ground floor, of course—many of these shares were offered at a price as low as one dollar, or even a few cents each.

The "clean-up" by these fraudulent promoters is estimated at anywhere from two to three billion dollars since the war closed. The conservative estimate for 1922 is placed at five hundred million dollars, very little if any of which is now, or ever likely to be, worth the paper on which the shares are printed. It is a terrible drain, as a large percentage of it comes from people who cannot afford to lose.

Some of the states already have what are known as "Blue-Sky Laws," which make it difficult to issue or sell fake securities. In other states there is so much latitude permitted incorporators, it is very easy to juggle a few hundred dollars worth of land into alleged assets represented by the hundreds of thousands or even millions. Bankers and other reputable financial institutions have tried constantly to caution the public against being robbed in this genteel manner, but too often the very ones they tried to warn, have been made to believe the warning came from some selfish or ulterior motive. And so this semilegalized or apparently legalized system is still going on. This magazine has repeatedly urged in the past, that before investing any funds in an enterprise of which your knowledge is limited to its own advertising matter, or its glib salesman, you submit the proposition to your banker. And even if you do not have a bank account, there are few bankers in the whole United States that will not cheerfully give a few minutes to even the poorest man, to tell him if the proposition is bad, or how to find out. Few of us would have the temerity to amputate our own leg or try our own case at law; we seek the counsel of men experienced in such matters. In consulting a banker the only difference is the service doesn't cost us anything.

RECORDS show that fully four per cent of all the boys and girls born in this country are left-handed from birth. An English scientist believes that the ratio is much higher in his country and around 10 per cent. The doctors are able to explain the physical condition of nerves which makes it natural for a child to use its left hand in preference to the other, but as to the cause of this condition they can only say, Nature willed it so.

*What Causes Stuttering?*

However, a most curious result has been discovered where attempts are made to force a left-handed child to use its right hand instead. Not in all cases, to be sure, but as far as the investigation has gone, a surprisingly large number of cases have been found, where parents or teachers used severe measures to force the use of the right hand, in which the child became a stutterer or had an impediment of speech. These varied in degree from a few years to life, and from acute stuttering to an impediment quite slight and hardly noticeable in ordinary conversation, but greatly aggravated under excitement.

It has been interesting to me, when coming in contact with people having impeded speech, to ask them if they were originally left-handed, and forced at home and in school to use the right hand. So far no one has been offended at such a personal question but all have shown great interest. In the instance of the most acute case of stuttering I have ever known, and whom I met daily for several months, the man could scarcely make himself understood and would appear at times almost to choke in the effort to articulate. Today he can shoot and throw a stone with unusual accuracy with his left arm, and very poorly with his right. He told me that during six or seven years, as a child, he was severely thrashed almost every day, both at home and in school, as his father was determined to "break him of the habit of using the wrong hand." In this case I judge both father and son possessed the same unyielding spirit—the son certainly has it now, and thinks, acts, and works with the speed of a hair trigger—but the father evidently dominated with his parental authority and strength.

Thus far nearly four out of five cases of impeded speech I have investigated, turn out to have been left-handed in childhood. Several left-handed persons, on whom no special effort was made to change, show no evidence of retarded utterance.

Scientists declare that it is much better not to try to force a left-handed child to become right-handed; that, if he does not readily and easily accept the change, to let nature have its way, and that in reversing nature, a mental-nervous clash arises which apparently in the majority of cases shows its disapproval of such outside interference by a greater or less disturbance of the speaking function. In these days we are becoming more enlightened and considerate in such matters as compared with 30 or more years ago, but it is pitiful to reflect on the thousands of cases, probably hundreds of thousands, where thoughtless, though well-meaning parents stifled and killed the natural inclination and individuality of promising, budding ambition, God-implanted.

It will be a greatly appreciated favor if any of our readers, knowing instances of people naturally left-handed, would report whether the effort to make them right-handed had any effect upon their speech or not.

AN editor is known by his readers to be absolutely misinformed on subjects in which they disagree with him; and the average reader is doubtless entitled to his doubts many times, but it remains apparently for the city salesman to really demonstrate, in almost brutal fashion, the completeness of the editorial mental density.

***How Not to Sell***

Having had occasion the past three months to purchase a great variety of office-building supplies, this hitherto unsuspected condition has been effectually demonstrated in my own case.

The first disillusion came with the salesman who represented letter-filing cases. Having stated our requirements, in terms of approximate number of letters daily, the young man looked wise, considered a minute, and decided what we needed was their C. S. 1.

"What is C. S. 1?" I inquired.

"Why," came in a somewhat grieved and condescending tone, "that's our letter file you want."

"Is it made of paper, metal, or wood?" I ventured.

"Oh, in case you are considering metal you want our F. D. X. and probably two N. C. O. for each F. D. X."

"Some of our manuscripts are pretty long," I confessed.

"In that event you will need F. D. X. with two N. C. O. for transfer for ordinary correspondence; and P. L. 1, with R. I. P. transfer for manuscripts."

By this time I recovered a little of my lost nerve and remarked, "Young man, what you say strikes me as R. O. T. What I am trying to buy is office furniture, not alphabets. If you will only talk Greek, Turkish, Armenian, or western Chinese, our translator could probably get a little intelligence out of it, as to the material, size, operation, capacity, color, and price of your goods."

"But," quoth he, "those are our catalog numbers."

"Sorry," I replied, "that I have not subscribed to your catalog all these years and hence am a bit shy on its terms; but do you want your pay P. D. Q., or W. W. R., and should it be, O. V. P., N., B. C., or S.?"

It was his turn to register ignorance, but he managed to say, "I don't get you."

"Well, these are our trade terms; P. D. Q. means immediately; W. W. R.,

when we're ready; and O. V. P. is our verbal promise; N. means notes; B. C. is bank check, and S. stands for 'simoleons'. I'm a bit surprised a lively young salesman like you is not familiar with our private marks for these things."

After a questioning which would have done credit to a lawyer on cross-examination, I managed to worm out of him the size, capacity, material, color, and cost of his various file cases, but it was like pulling back teeth with tweezers, and he seemed to realize he had grossly betrayed secrets belonging exclusively to his firm.

If he had been the last and only one, these lines would never have been written. But, unfortunately, he merely opened the ball. They came in droves; fine, clean, bright-faced, earnest young fellows; every one good to look at; and all talking the same catalog lingo which, of course, was unintelligible to me. Even when I got down to scrubbing brushes one tried to sell me F. H. B., which turned out to be "fiber and hog's bristles," and when the stuff came, C18 turned out to be some kind of a mop.

With scarcely an exception they all reeled off yards of (to me) utterly meaningless trade letters and numbers with a confident air of profundity which at first was amusing but quickly became exasperating. My conclusion was that if these young salesmen were selling my goods I would get some friend to send for one of them, and I would sit concealed where I could hear their puzzle talk and then I would go home, call the boys all in, and give a few first easy lessons in salesmanship, or buy a course in some correspondence school for each of them, or both.

H. H. WINDSOR

Recently Completed Central Police Station of Detroit, in Which the Prisoners' Quarters Are on the Two Top Floors: A Powerful Radio Outfit Is Another Feature

## NEW CENTRAL POLICE STATION COMPLETED IN DETROIT

Prisoners' quarters occupy the two top floors of the new central police station recently opened in Detroit. It is thought that this arrangement will be more healthful and, at the same time, will have a moral effect for the better on those who may be confined there. Another means used to carry out this latter idea is the prisoners' entrance. This is built adjoining the police garage, from which the prisoners enter a private reception room and thence go up in a special elevator, removed from the other occupants of the building. Telephone equipment enabling a message to be transmitted over 50 lines at once, and a powerful radio outfit, are other new features. The station is nine stories high and cost about 1,700,000 dollars.

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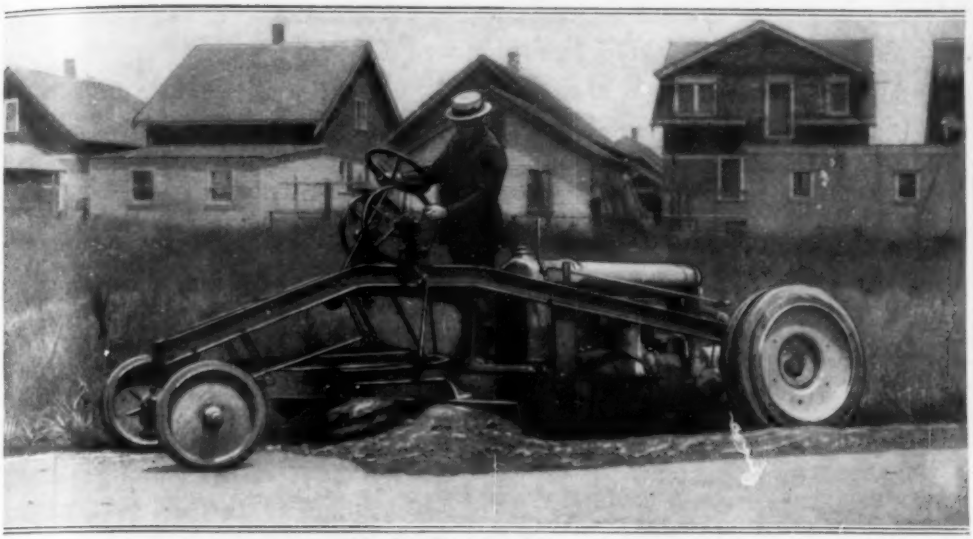
¶A $2,000,000 wireless plant, operating direct to Australia and England, will be built at Vancouver, B. C.



The New Road-Grading Outfit, Pictured Here, is Run Entirely by One Man, Who Stands on a Platform Built in Front of the Gasoline Engine. Within Easy Reach of the Operator Are Controls for Steering the Machine, and for Raising, Lowering, or Turning the Blade

## ONE MAN OPERATES MOTOR-DRIVEN ROAD GRADER

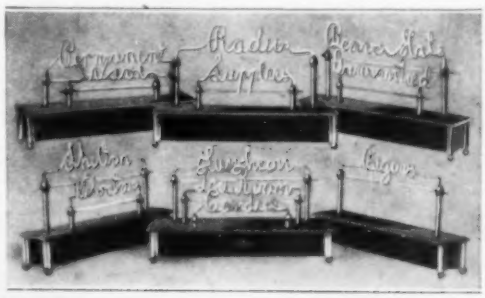
A road-grading outfit operated entirely by one man is one of the latest improvements in road-building machinery. The frame of the grader rises and runs pyramid-fashion from an axle joining two small front wheels to two larger wheels in the rear. Just ahead of these wheels is placed a gasoline motor, while in front of the motor is the operator's platform and, within easy reach, controls for steering the outfit and for adjusting the blade.

## LABOR-SAVING STAND FOR BAGS HOLDS VARIOUS SIZES

Not a few industrial concerns that ship their small metal products in bags find it necessary to have extra men hold the bags as they are being filled. To do away with this waste of labor, one company has originated an inexpensive metal holder. It is simple, consisting merely of two semicircular sections of metal, one larger than the other, connected by three uprights. Either of the semicircular pieces can serve as a base, and removable pins in them hold the bag.

## "VACUUM-TUBE" SIGNS YIELD LIGHT AT SMALL COST

"Vacuum-tube" signs, consisting of continuous glass tubing bent into letter-



These Novel Window Signs are Made with Colored Glass Tubes Which are Illuminated with a Continuous or Alternating Current

ing or numerals, the whole being lighted by either direct or alternating current at common voltages, are new advertising features. As many as three lines of script or number units may be arranged in one sign, which displays a deep-red or orange color when illuminated. The operating cost is negligible, as only from 8 to 10 watts are required for any length or number of units. No noticeable heat is radiated from the tubing, which is thus said to yield a "cold" light.

A Smoke Bomb Set Off by One of the Life Guards at Long Beach, California, Signals the Operator of a Launch, Who Immediately Starts toward the Distressed Bather

# NEW METHOD OF BEACH PATROL

By FREDERICK HERR

WITH more than five miles of beach and surf-bathing facilities, Long Beach, Calif., has the largest bathing beach on the Pacific coast. More than 100,000 weekly gather here from Los Angeles and other parts of southern California, and Sunday crowds during the summer months have reached as high as 70,000 in one afternoon.

To train and equip an efficient life-guard corps for the adequate protection of such vast numbers of bathers, had long been a subject of study to the Long Beach municipal authorities. The old plan of stationing life guards at intervals along the beach and the various piers, and making rescues by launching a boat from shore, had been in practice for many years. This system offered a certain amount of safety, but fell short of the perfection which was the aim of the authorities.

After experimenting with various methods of life-guard arrangement, a system was devised that has no counterpart either on the west coast or elsewhere in the United States.

Under the supervision of Squire Duree, commissioner of parks and recreation of the town, the so-called "Duree system" was adopted. The beach is divided into nine life-saving districts. The system involves the use of smoke bombs to signal the pending rescue of a bather who has ventured into treacherous water. A lookout is on guard at the end of an 1,800-foot pier, which extends into the ocean midway between the nine life-saving stations. A 21-foot power launch, equipped with first-aid necessaries, pulmotor, and stretcher bearers, is moored at the end of the pier, ready to be dispatched to any part of the sea front at a moment's notice. When a life guard is about to make a rescue and needs assistance, he sends up a smoke bomb. The lookout at the pier's end sees this signal, and immediately sets forth with the launch to the scene of trouble.

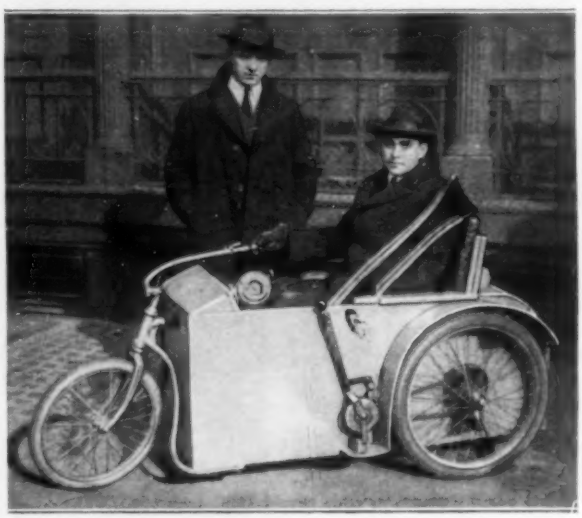
It has been found from experience that a boat can approach a bather in distress more rapidly and more safely from the sea side than were it to set out from shore through the breakers. When a bather has been picked from the sea and is in immediate need of medical assistance, a white flag is hoisted on the power boat. This is the signal of distress for the men on the pier to communicate with a doctor. In many cases the prompt arrival of the physician, made possible by the distant signals, has saved lives.

The system is taking hold in the East and will be put into effect at some of the east-coast resorts next summer. Its application was explained in detail at the World's Congress of Community Service, at Atlantic City, in August last year, and was indorsed as a decided step forward in life-saving.

## LEGLESS MAN DRIVES CAR OF HIS OWN DESIGN

A small automobile that can be driven by a legless man, was recently designed by a New Yorker who lost the use of both legs during service in the Mexican-border campaign. The machine, which was successfully demonstrated at the Institute for Crippled and Disabled, in New York City, is a motor-driven, three-wheeled vehicle, 76 inches long and 32 inches wide, and can carry three persons. All the controls are hand-operated.

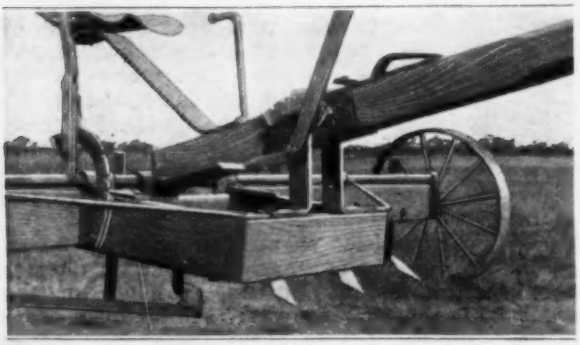
¶As many as 50,000 persons in France have wireless outfits in their homes, according to a report recently published by the post and telegraph department.



Motor Car of Special Design Which is Successfully Operated by a Legless Man: It Is 76 Inches Long and 32 Inches Wide, and can Carry Three Persons

## WEEDER FOR DRY FARM LANDS CUTS WIDE SWATH

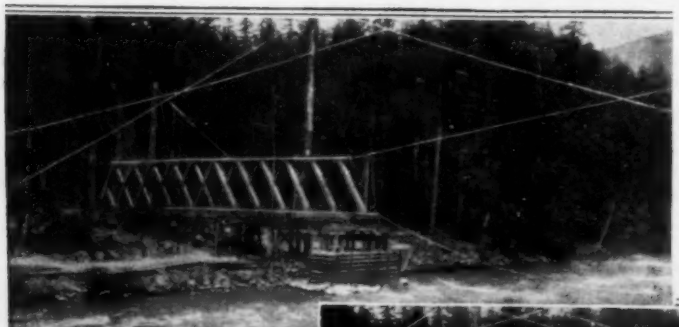
For use on western dry farm lands, during the fallow year, a weeder with two blades, cutting a 9-foot swath, is now on the market. The machine is mounted on two widely separated wheels with an axle offset eccentrically for its whole length. This axle supports an iron frame, the center portion of which extends forward rectangularly. Suspended from this frame, and on either side of the forward extension, are the two cutting blades. From his seat above the frame the driver swings the offset axle forward and down, setting the blades just below the ground with a lever at his right-hand side, while other levers enable him to regulate the pitch of the blades, or to return them to their raised position. The implement saves about one-half the time usually required for this work.



**Weeder for Use on Dry Farm Lands: The Levers, Seen Handy to the Driver's Seat, Raise and Lower the Cutting Blades That are Suspended below the Frame of the Machine**

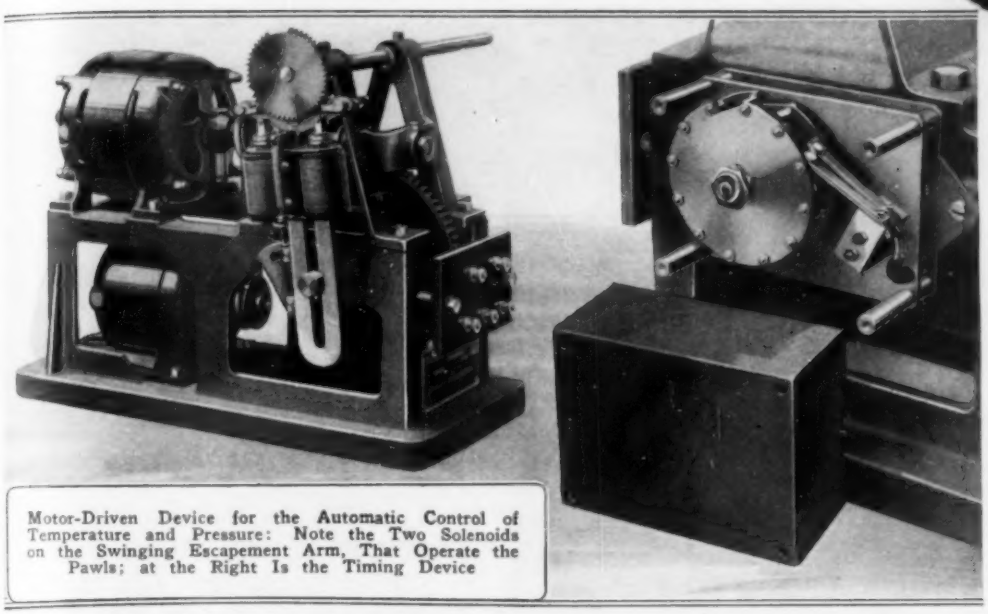
## BRIDGE THROWN ACROSS RIVER BY UNUSUAL METHOD

Logging operations in the big timber tracts of British Columbia frequently call upon the engineers for emergency exhibitions of their skill. In an operation on the Cheakamus River, it became necessary to put a single span across 130 feet of raging torrent. The approaches and piers were first constructed, then a single truss was built of timbers, those in the sills, or lower chords, being single sticks, 20 by 26 inches. A spar tree used in one setting of the logging operations stood right alongside the pier on one side of the river. The completed truss was run out on rollers until it nearly balanced on the pier. The carriage on the sky line was run out to the outer end of the truss, a heavy steel cable was fastened to that end, and the truss was carried across just as a log would have been handled. The end was then dropped on the pier at the other side. The actual time required to swing the truss was not more than a few minutes.



**In the Photograph Above, the Completed Truss is Shown as It Appeared Just before being Pulled Out of, and over, the River**

**This Picture of the Truss was Taken as Its Right End Reached a Point About Midstream. A Few Moments Later It was Dropped in Place on the Piers, Which had Already been Constructed**



Motor-Driven Device for the Automatic Control of Temperature and Pressure: Note the Two Solenoids on the Swinging Escapement Arm, That Operate the Pawls; at the Right Is the Timing Device

## AUTOMATIC VALVE REGULATOR HAS GREAT FLEXIBILITY

The feature of a new valve regulator is its accuracy over a wide range. It is adapted to the automatic control of temperature or pressure, for a variety of service in connection with the use of oil and gas-burning systems, electric and steam-heated apparatus, refrigeration apparatus, and compressed-air and vacuum lines. It is designed so that each individual adjustment of the control valve can be made a small part of the total movement, and with a time element that allows one adjustment to take effect before the next can be made. The escapement, which directly controls the movement of the valve and by means of which the adjustments are made, consists of a ratchet-and-pawl mechanism governed by two solenoids mounted on a swinging arm hung from the ratchet shaft. A timing device capable of fine adjustment, constantly interrupts the circuit that energizes the solenoids. A small motor transmits power through a worm and gear and an adjustable cam to the lever arm on the escapement. The solenoid circuit is connected to a temperature or pressure element located in the apparatus which it is desired to control.

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¶ Free medical advice by radio is to be given ships at sea by the Bureau of Public Health Service. It is expected that most requests for advice will come from vessels not carrying a ship's doctor.

## MACHINE FOR SOLDERING COMMUTATOR BARS

All motors and generators using commutators have a very large number of joints that must be soldered, and for doing this a machine has been designed that will solder all the segments of a commutator at once, making better joints, it is said, than when this work is done by hand. Burners are provided which can be adjusted for either natural or artificial gas, and they are covered with a jacket to protect the operator from the heat. The products of combustion may be piped to the outside. During soldering, the armature is held stationary by the machine, the position being independent of any skill of the operator. Hand and foot controls are located within convenient reach of the man using the machine.

## FOUNTAIN MADE OF TOWELS SEEN IN FRENCH STORE

Seven thousand towels were used in fashioning an imitation fountain made entirely from this material and recently exhibited at a large department store in Paris. The work, about 15 feet high, has a solid architectural background, topped by a cornice 10 feet in length. Beneath the cornice and between two side columns is a niche occupied by a peacock standing on a rough-cut "rock." The "water" flows from the bottom of this rock.

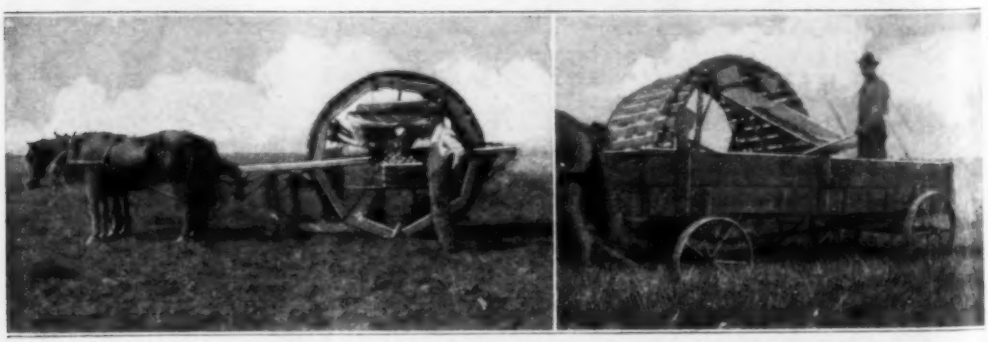
Imitation Fountain, Made with More than 7,000 Towels, Which is Now being Exhibited in a French Department Store

## CONCRETE POLES SUPPORT 132,000-VOLT LINE

Steel-reinforced concrete poles have been used over a portion of a 132,000-volt transmission line recently built in Sweden. Each support consists of two 61-foot poles carrying a crossbeam 57 feet above the ground, on which the conductors are arranged horizontally, 20 feet apart. Each pole is designed for a pull of 1,320 pounds at the top, with a factor of safety of four. One underwent a test pull of 6,750 pounds and deflection of 4.6 feet without showing cracks or permanent deflection. They are made of steel rods circumferentially placed and interwoven with steel wire. This skeleton is placed in a hollow mold and the whole made to revolve rapidly while the concrete is poured in.

## NEW IMPLEMENT DIGS, PICKS, AND SACKS POTATOES

A recently invented potato harvester combines simplicity with adaptability to different ways of handling the potatoes after they are dug. It can be used to dig, pick up, and load the potatoes into a wagon or into sacks as a continuous operation; as a plain digger, or just for the purpose of picking up the potatoes. It consists of a drum, 8 feet in diameter and 7 feet wide, built up of hardwood slats spaced about 1 inch apart on iron hoops, with iron spirals inside, to which are attached the digging disks. As the drum is pulled along the ground, the action of the spirals picks up the potatoes and carries them to a basket which is automatically inverted at the top of the drum. The absence of gears and other mechanisms makes the harvester very light and easy to maintain.



Left: Drum-Type Harvester Picking Up and Crating Potatoes: Two Horses Haul the Machine with Ease, and as There Are No Gears or Other Mechanisms, Upkeep Is Low. Right: Harvester Delivering Potatoes through a Canvas Chute to a Wagon Alongside

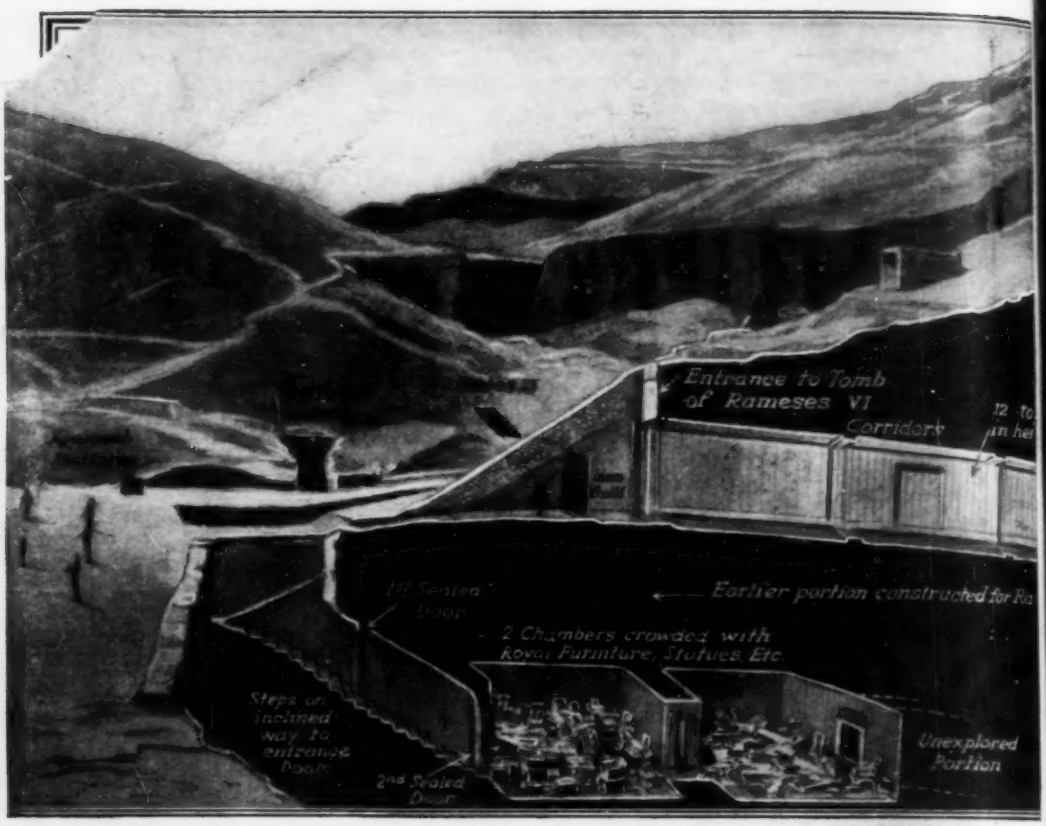
The "X" below the Gateway of Another Tomb in the Center, Marks the Entrance to the Recently Discovered Tomb of Tutankhamen

# TREASURES OF ANCIENT THEBES IN NEW-FOUND TOMB

By R. C. Folger

TREASURE that has been variously estimated to be worth from $15,000,000 to $40,000,000, has recently been brought to light upon the opening of a tomb believed to be that of Tutankhamen, who ruled in Egypt over 3,000 years ago.

The first objects to greet the eyes of the entrants to the tomb, were three magnificent state couches, each made of gilt wood with exquisite carvings and decorated with a lion's head and other emblematic figures. On these rested gilt beds also beautifully carved and inlaid with ivory and jewels, and a number of boxes of rare workmanship. These boxes were inlaid with ivory and ebony with gilt inscriptions. One box, hung with painted hunting scenes, contained royal robes richly embroidered, precious stones, and golden sandals. Beneath one of the couches was the state throne of Tutankhamen, the first of the thrones of ancient Egypt revealed to modern eyes and reported to be one of the most beautiful objects of art ever discovered. There were also four chariots richly decorated with gold and studded with semiprecious stones, the charioteer's apron of leopard's skin still hanging from the seat. Two life-size statues of the king, holding a golden stick and mace, stood facing each other, the features delicately carved and the headdress studded with gems. A number of quaint-looking musical instruments made of gilt bronze were in the rooms. There were also alabaster vases with a very intricate design of an unknown origin, and some handsome pieces of glazed art pottery. Quantities of provisions for the dead were found packed in boxes, according to the peculiar custom of the times. Among these was some embalmed beef, in containers resembling huge Easter eggs, which was in an excellent state of preservation though not wholly palatable. In one of the boxes were rolls


Entrance to Tomb of Rameses VI
Corridor
Earlier portion constructed for Ra
2 Chambers crowded with Royal Furniture, Statues Etc.
Steps on inclined way to entrance Door
2nd Sealed Door
Unexplored Portion

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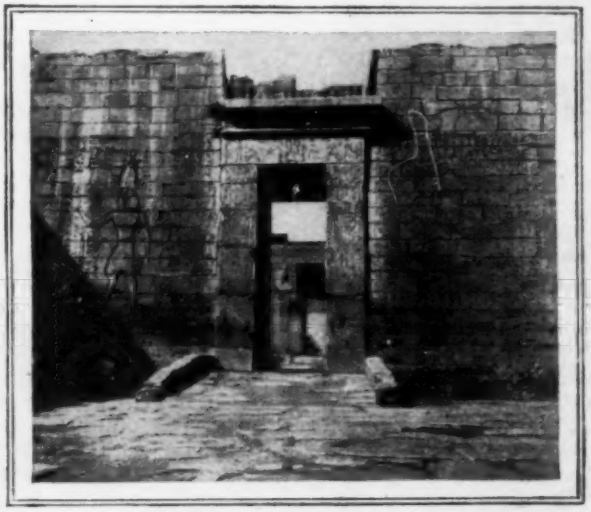
**It Was in the Tomb of King Tutankhamen, the Successor of the Famous Akhenaten and Smenkhkara, Who Were Co-Unearthed were Found. The New-Found Tomb Lies below That of Rameses VI, and Its Discovery Is a Credit to Ceased Their Search. It will Be Interesting to Learn What Is in the Unexplored Portion of the Tomb That**

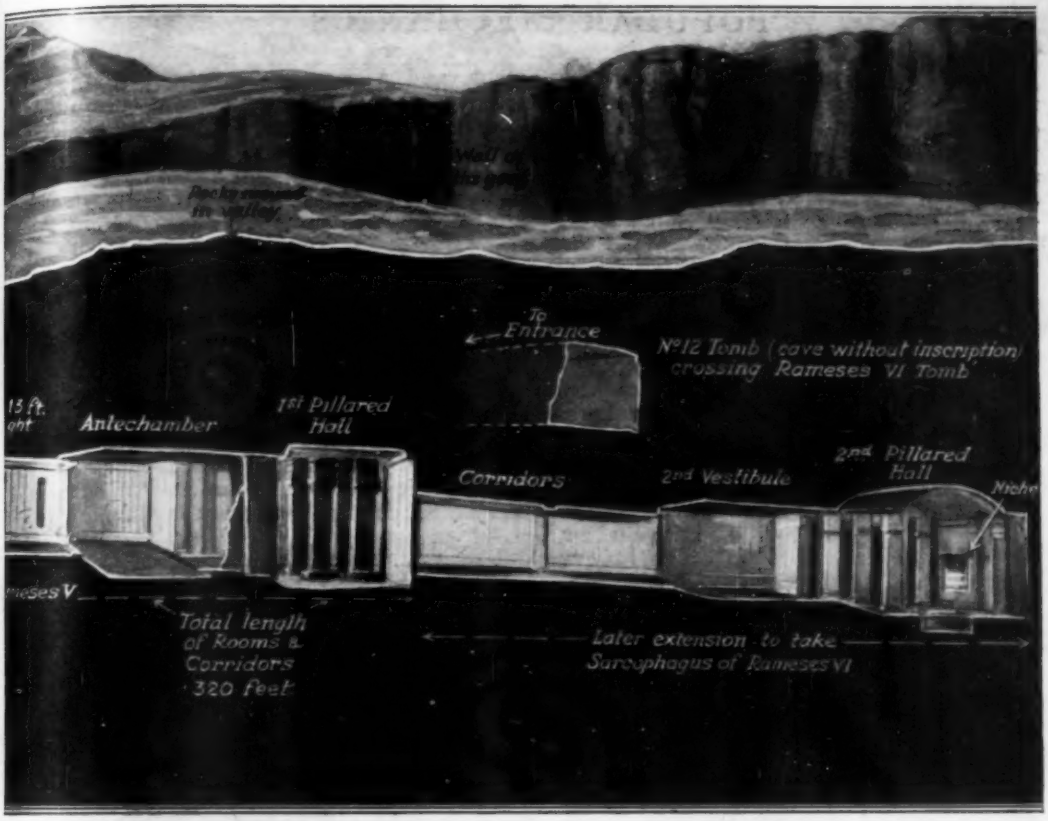
of manuscript which are expected to yield much valuable archæological information.

The second of the two first chambers, connected by an open doorway, was in such a state of confusion as to indicate that the tomb had not remained undisturbed after the doors had been sealed, following the funeral rites to the dead king. Furniture and other objects, similar to those found in the first chamber, were piled high, and closely packed in a manner that led the investigators to believe that part of the funeral paraphernalia had been hurriedly removed to this chamber to keep it from thieves.



**Front of an Ancient Theban Temple—Covered with Hieroglyphs—Unearthed at Luxor by the Discoverers of Tutankhamen's Tomb**

What lies beyond the sealed doors of a third chamber lends interest to the discovery, for it is there that the two figures of the king stand guard. It is hoped this may turn out to be the actual burial chamber of Tutankhamen and the members of his family, but until the material has been cleared from the other chambers, this question cannot be settled.




BY THE SPHERE, LONDON

Regents in Egypt from 1375 to 1358 B. C., That Some of the Greatest Treasure and Relics of Antiquity Ever the Persistence and Instinct of the Men Who have Kept Digging Away at the Mound Years after Earlier Explorers Lies beyond the Second Chamber. This was Closely Packed with the Funeral Paraphernalia of Tutankhamen

The tomb lies below that of Rameses VI, which was discovered a few years ago, and is chambered out of the rock in a low hill formed at the foot of a cliff in the famous Valley of the Tombs of Kings, located near the site of ancient Thebes. There are also the tombs of other kings that have been discovered in this hill. It is remarkable that the entrance to Tutankhamen's tomb is so close to grounds where scores of workmen and many a skilled excavator must have passed while engaged in search for the secrets of the Theban necropolis. Perhaps its very nearness to these already explored sites led them to think that there was no need to search the unexplored strata below.

Entrance to the Recently Discovered Tomb Which has Remained Unopened for Over 3,000 Years: Note the Descending Row of Steps

The discovery is the result of the persistence of Lord Carnarvon and his two assistants, Howard Carter and B. Callender, who for 16 years have been following the discouraging work abandoned by those who made the earlier discoveries. In dig-

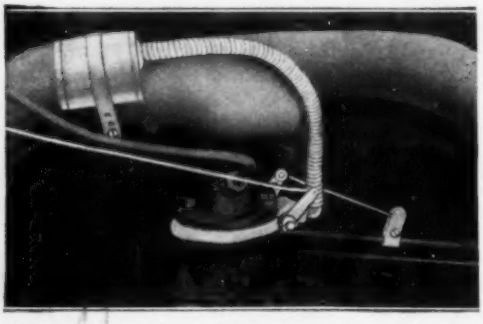
ging among the stones below the entrance to the tomb of Rameses VI, they uncovered what was to their experienced eyes traces of an opening in the wall. Continued digging disclosed a carefully hidden and tightly sealed door. This doorway opened into a stairway of some 16 steps, and a passageway, about 25 feet long, at the end of which was another door even more securely sealed than the first. After the second door had with difficulty been opened and the three men managed to squeeze through, they were rewarded by the sight of the first chamber.

## BINOCULAR MAGNIFIER ALLOWS USE OF BOTH HANDS

An improvement over the single magnifying glass worn like a monocle by watchmakers, jewelers, and others who do close work, is seen in a new binocular magnifier. This device, which is built like the modern prism binocular, is held on by a band that passes around the head and enables the wearer to use both eyes simultaneously, both hands being free for work. A small electric light with a condensing lens provides illumination for intricate work.

## INTAKE-AIR HEATING DEVICE FOR AUTOMOBILE MOTORS

Easily installed between the carburetor and the intake-manifold flanges, a device designed for the delivery of gas and air mixtures of proper proportions and temperature to the cylinders of internal-combustion engines, is now on the market. Like other devices of the kind, it operates in connection with the hot exhaust manifold, and is said to keep the intake manifold at a temperature of about 150° F., thus insuring complete vaporization of the gasoline in the mixture. It is controlled by the carburetor-throttle rod, to which it is attached, and has an auxiliary dash control for fine adjustment.



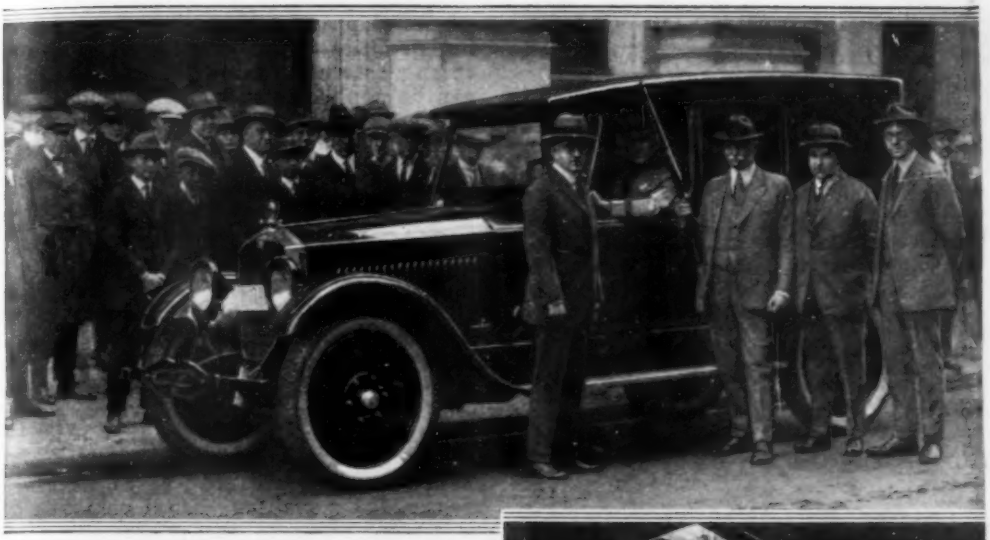
Air-Heating Device Installed on an Automobile Engine, Showing Its Controlling Attachment to the Carburetor-Throttle Rod, and the Auxiliary Control for Fine Adjustment

## SAFETY DEVICE FILLS NEED OF TEMPORARY LOCK

Sometimes the need is felt for a temporary lock to be used on doors or windows of a summer cottage, or other building, and then detached and taken away. Locks on the doors may be out of commission and a feeling of greater security will be enjoyed with an additional lock. Such a lock is provided by a new safety device which may be attached with nails or screws or by pressing into the door jamb. It is said to be so strong that it will withstand the pressure of three men.

## ARMORED CAR OF NEW TYPE TO FOIL HOLDUP MEN

An armored car for the foiling of holdup men has a body entirely constructed of armor plate, fitted with bulletproof glass windows, windshield, and side wings, the whole closely resembling an ordinary town car or limousine. A steel-armored safe has been built into the rear, or inclosed part of the machine, which is designed to carry only two passengers, the

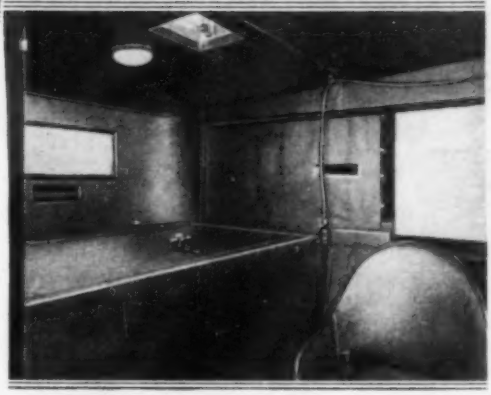


This Armored Car, Made to Foil Bandits, Has Only One Entrance to the Rear Compartment, There Being a False Door on the Left Side

driver and the messenger in charge of the money. The driver sits in front in the usual position, while the messenger locks himself in the rear. Loopholes with sliding armor-plate covers are provided at both sides and rear of the car so that the messenger may shoot in any direction. In the event of an accident to the driver, the messenger can assume full control of the machine by means of a tandem brake and other necessary arrangements. A special feature of the car is the construction of a "blind" door on the left side, which has been noted to be the usual point of entrance when a holdup takes place, thus assuring any would-be bandits a disconcerting surprise at the outset.

## DEVICE EQUALIZES TENSION OF DRUM SNARES

A device for equalizing the tension of the strings of a snare drum has recently been patented. It consists of a steel arm running across the drum head and extending a few inches beyond at each side. The snares are fastened at both ends in such a way that all of them have an equal tension, and retain this whether the device is released or not.



Interior of Rear Compartment of Armored Car, Showing Messenger's Seat and Safe in the Place of the Usual Rear Seat

## INVENTION ADDS TO SAFETY OF SHIPS AT SEA

By means of an apparatus for producing extra-sonorous waves, it is hoped to reduce the danger of collision and of ships running aground at sea. A spark emitted from an ordinary radio-broadcasting outfit is transformed by the new apparatus into sound waves that travel through the water at a speed of nearly 5,000 feet a second. The same device registers the echo returned from an obstacle and transforms it into electrical oscillations which are also recorded by the instrument.

¶ The Pavlof volcano, at the tip of the narrow Alaska Peninsula stretching toward Asia, is reported to have lost its top in a great eruption occurring late in December, last year.

## IMPROVISED PILE DRIVER IS SIMPLE AND EFFECTIVE

A homemade pile driver, constructed in the short space of three hours from some 2 by 4 and 4 by 4-inch lumber and a few bolts, proved to be as practical to operate as it was economical to build, to the resourceful contractor who devised it. Two 4-by-4's formed the runways for

Effective Pile Driver Constructed in Three Hours' Time from Stock Lumber, and Fastened to the Rear of a Contractor's Truck

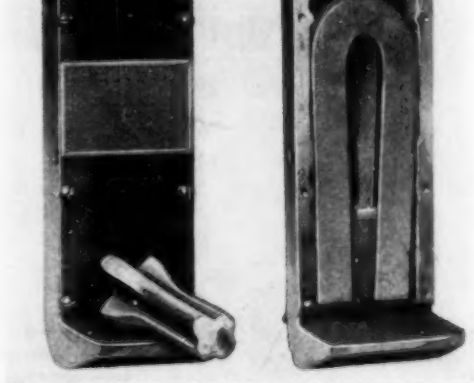
the 2,500-pound hammer, which was raised by a cable passed through a sheave at the top and wound around the drum of a winch on a motor truck.

## IMPROVED PROPELLER DESIGN APPLIED TO SHIPS

What is called a contra-propeller has been applied to ships in Europe and has effected an increase of 12 to 18 per cent in propulsive force. It consists of a number of blades—usually six—affixed to the rudder stem about 18 inches behind the main propeller in such a way as to turn the revolving stream of water coming from the main propeller, into a straight flow, this action being responsible for the increase in propulsive effect upon the ship. It is said, also, that the vibrations of the ship are decreased, and the steering qualities improved, while the ability to run astern is undiminished. The idea can be applied to reduce the quantity of fuel consumed, instead of increasing the speed. The contra-propeller is designed to break should anything come between it and the main propeller.

## MAGNETIC INDICATOR USED IN TEMPERING STEEL

It is a well-known fact that drill steel, in order to be tempered for the greatest possible toughness and resistance to wear, should be quenched at the lowest possible temperature above the critical point, which is the point at which the structure of the steel changes. This point coincides with that at which steel loses its magnetism, and advantage has been taken of this coincidence in the production of a magnetic indicator to assist the blacksmith in quenching his steel at the proper point. The indicator consists of a brass or bronze casing, inside which is a horseshoe magnet hung on a pivot at its point of balance. At the top is a small window, and a white indicator tab which is so balanced that when the bottom of the magnet is pulled forward the top will strike a lever and push the indicator into view. A shelf at the bottom of the casing is used as a rest for the steel. When the blacksmith judges the steel to be approaching the critical stage, he rests the



Left: Magnetic Indicator with Cover On, and a Drill Bit on the Shelf. Right: Cover Removed, Showing Horseshoe Magnet

heated end on this shelf, and if the tab does not show in the window, he knows the steel is ready for quenching.

# HEDGEHOG HUNTING GOOD TRADE AND GOOD SPORT

By SAM E. CONNER

TRAPPING hedgehogs does not sound like a very attractive pursuit, but a man in Maine has found it to be a profitable business, as well as one that has an element of danger, and therefore offers excitement in excess of that which comes to a rabbit or fox hunter. While it is not generally known, there is a steady demand for these ugly-looking creatures from all sections of America and Europe. They are desired for zoos and menageries, both private and public, and country-fair and street venders, who use them to aid in selling preparations, disposed of under the name of hedgehog oil, hedgehog liniment, and like titles, provide still another market.

A Maine Man's Outfit for Catching Hedgehogs: It Is Simply an Old Washboiler with the Cover Hinged by a Wire; in Addition He Sometimes Uses a Stick to Poke the Animals Loose from Tree Limbs

All of these buyers are in constant need of the hedgehogs, for the animals do not live long in captivity. This man has been catching hedgehogs more than 20 years and has shipped thousands of them. In a single month, a few years ago, he shipped three tons; and one shipment to England, which, by the way, is one of the largest customers for hedgehogs, in the spring of 1922, required four horses to haul it to the railroad station.

The Boiler is Thrown over the Hog and the Cover Then Quickly Slid into Place While the Boiler is Turned Over; Usually the Hunter Wears Gauntleted Gloves to Protect Himself against the Sharp Quills

The trapping is all done in the summer and at night. The best time for catching the animals is between 9:00 p. m. and 2:00 a. m., and there is no better hunting ground than an apple orchard. The hedgehogs come there to feast upon the apples, of which they are exceedingly fond. The outfit for catching them consists of an old washboiler, the cover fastened on one side by means of a wire hinge; a long pole, and a pair of heavy gauntlet gloves for protection against the quills, which the animal has a disagreeable habit of "throwing" when in danger. The pole is used to dislodge the hedgehog from the tree limb on which it may be found. Once the animal is on the ground, the trapper must step lively or his prize is gone. Clumsy as it looks, the hedgehog makes a quick getaway when frightened, and the darkness of night is a further help to it. It is a rush forward, a quick throw of the boiler over the escaping animal, a deft overturning of the boiler, and closing of the cover. It is all over in a jiffy, providing the trapper's aim is good. A specially constructed box, lined with galvanized iron, is part of the outfit, and is used for taking the night's catch back home.

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¶Ordering various qualities and sizes of steel by number will soon be a general practice in the United States, if plans of engineering organizations materialize. The present method requires long and detailed specifications. Germany, Switzerland, and several other European countries already use number systems.

## FAST COUNTING OF SMALL MACHINE PARTS

Filling boxes or cartons with small machine parts rapidly and accurately is the result accomplished with the specially devised tray and the "counting-by-five" system used by an Illinois manufacturing company. With three fingers of one hand and two of the other, the operator sweeps the small parts rapidly into the container until it is filled with the correct number.

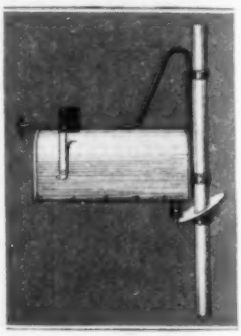
A Special Tray with Chute for Rapidly Counting Small Machine Parts and Filling Boxes with the Proper Number

## TOYS OF AMERICAN INDIANS EXHIBITED BY MUSEUM

Crude dolls, tiny imitation horses, and other playthings recently put on exhibition by the U. S. National Museum, indicate that the children of the American Indian played with toys in a manner very similar to the practice of present-day children. Animal dolls appear to have been most popular. A wild duck which an Eskimo had stuffed for his baby and a beaver fitted with an imitation tail of leather, are among the more original ones.

## RURAL MAIL BOX SWINGS AROUND IF HIT

If struck by a moving vehicle or other object, a new rural mail box revolves about its supporting pole, and by the force of gravity swings back to its normal position. The keynote of the arrangement is found in a wide metal disk around the pole, beneath the box, which is tipped at an angle, and, at its lowest end, connected to the bottom of the box. Smaller bands hold the box to the pole.



## BURROS CARRY PIPES MAILED AS PARCEL POST

The Pipes Carried by These Burros were Sent by Parcel Post by a California Road Contractor When He Found This would Be Cheaper than to Do the Transporting Himself

Finding that transporting corrugated-iron culvert pipe to an isolated region between the Klamath Mountains and the Pacific coast would cost much more than he had planned, a California road contractor solved the problem by mailing it. The postal authorities making the delivery through the rugged country had to resort to burros, two sections of pipe being strapped to each animal. The shipment was to be used in building a road through that region, to be called the Klamath River Forest Road.

New Apparatus for Heating Asphalt Pavements Which are to be Resurfaced: Connected to the Steel-Plated Hood, Shown Here Resting on the Ground, Are Oil Burners, and Air-Blast Pipes Which Blow the Flame Downward

## HEATER ON AUTO TRUCK USED IN RESURFACING ASPHALT

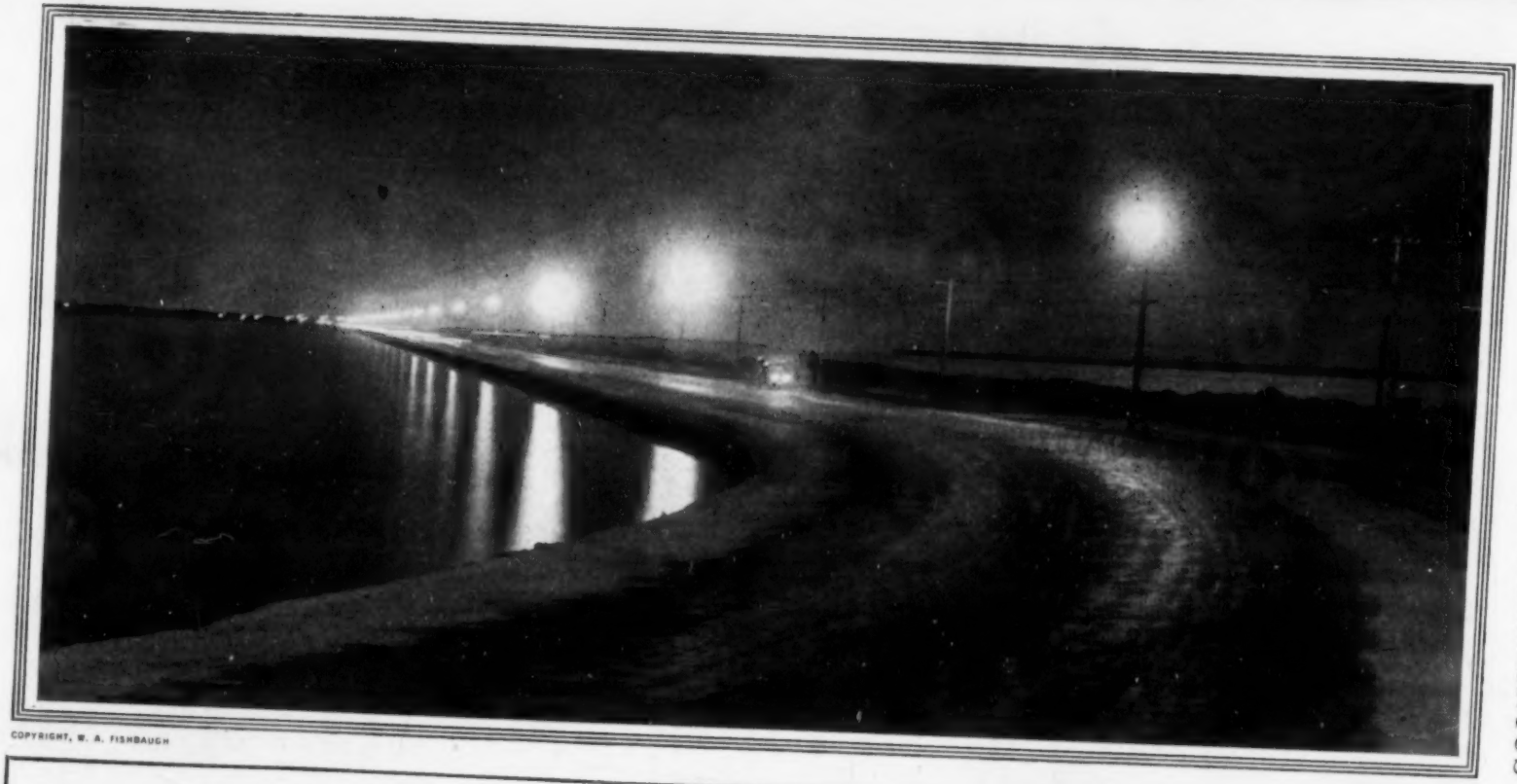
An improved apparatus for heating asphalt pavements which are to be resurfaced, is mounted on a small auto truck. Behind the driver's seat is arranged an air tank, a blower, a fuel-oil tank, and an air-heating chamber with oil burners, connected to a steel-plated hood. Both hood and heating chamber are raised or lowered by a hydraulic hoist, while coil springs, attached to a high metal frame, counterbalance this weight and permit the hood to rest gently on the pavement. The capacity of the machine is said to be about 1,000 square yards per eight-hour day.

## WELD SPECIAL STEEL SURFACE TO MACHINE PARTS

Encouraging results have been obtained from experiments conducted to determine the practicability of welding special steel to ordinary machine-steel working parts. This was shown in the case of some internal-combustion motor valves to which was welded a thin layer of chrome-steel alloy, the valve being finished in the usual way. Tests made under actual operating conditions failed to show any defects, and a micrographic examination disclosed no weakening of the joint. This corresponds to the practice of welding special steel bits to shanks of ordinary steel.

## VENDING MACHINE SELLS HOT SHELLED PEANUTS

Delivering shelled peanuts hot into the hand of the purchaser who drops a coin in it, is the novel feature of a new vending machine, which is designed to be placed in cigar stores, railroad stations, or other public and semipublic places. It weighs eight pounds, and the electric current which keeps the peanuts warm also flashes out a light at intervals. Two to three cents for a 10-hour day is claimed to be the cost of current. It takes about half an hour to heat the reservoir full of peanuts, and thereafter they are kept automatically at the right temperature.



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## MILLION-DOLLAR CAUSEWAY ILLUMINATED FOR NIGHT DRIVING AT FAMOUS FLORIDA RESORT

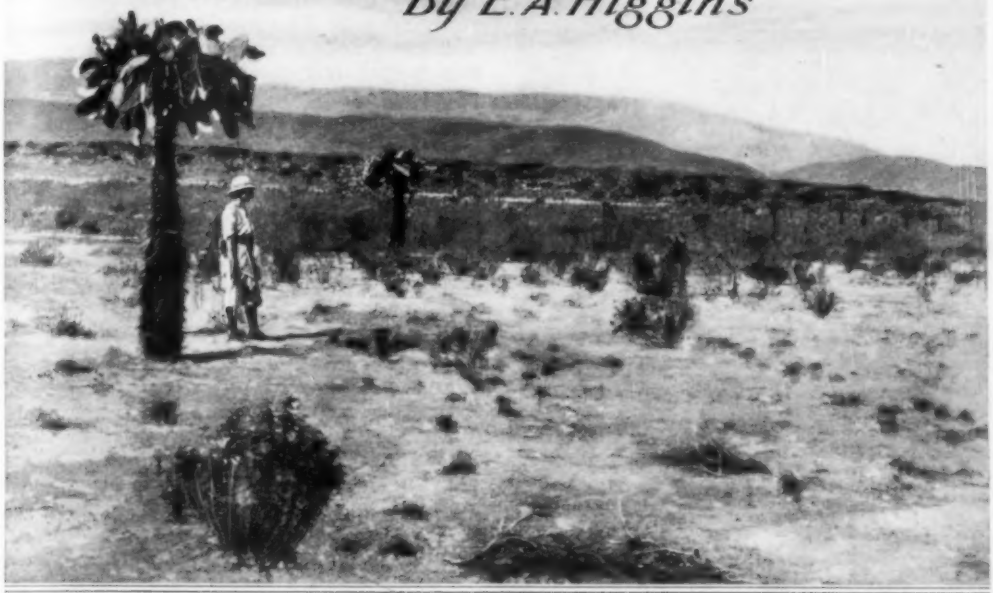
BRILLIANTLY lighted, the million-dollar concrete causeway, 3½ miles long, that connects Miami, Fla., with the beach across Biscayne Bay, has been opened to the public recently. The driveway, which takes the place of a wooden bridge, is 105 feet wide, has a double automobile roadway, a two-way drive for heavy traffic, and the track of an electric line in the middle. Twelve thousand motor cars a day is a common record here.

Electric lights, giving sufficient illumination for driving at 30 miles an hour with lights dimmed, are placed on poles 30 feet above the surface, 400 feet apart on the straightaway course, and 300 feet apart on the curves. Lamps of 250 candlepower are used.

Absence of guide posts and fences on the sea wall made driving dangerous till these lights were installed. A thorough trial proves that they make driving safe, with the flood of light that they give.

# ODD REPTILES *from* SANTO DOMINGO

*By E. A. Higgins*



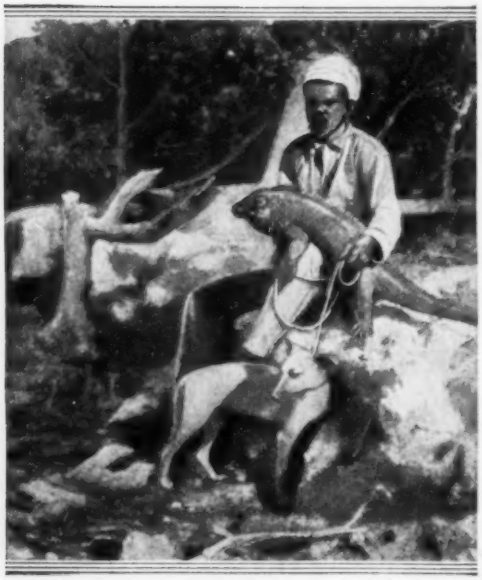
View of Reptile-Ridden Island in a Salt Lake, 160 Feet below Sea Level, on the Island of Haiti, near Santo Domingo, Capital of the Dominican Republic: Here the Explorer Found Great Numbers of Rhinoceros Iguanas and Other Queer Representatives of the Reptile Class

A LARGE collection of curious reptiles has been brought recently to the American Museum of Natural History in New York, by Dr. G. Kingsley Noble, who, accompanied by Mrs. Noble, spent three months in Santo Domingo at the head of a scientific expedition which went there to hunt and study its reptile fauna.

Doctor Noble, who is an authority on these animals, had often heard stories of unusual specimens which were said to live in that region. Therefore it was with great interest that he set out on the expedition, which was organized by the American Museum of Natural History and financed by the Angelo Heilprin Fund. And he met with odd experiences and odd reptiles, too. The experiences, of course, are not on exhibition, but the reptiles are, many of them alive, some in jars, and some mounted.

The Rhinoceros Lizard in Profile: This Animal Grows to a Length of Five Feet and Corresponding Weight, and Is Very Fierce and Fearless When Disturbed

The most interesting creatures in the collection, from a natural-history standpoint, are 40 living rhinoceros iguanas. These are the largest lizards in the world. They grow to a length of 5 feet and attain great weight, and are more like the great prehistoric reptiles than any known living creature. They acquire their name from three hornlike growths that project from the ridge of the nose like the horn of the rhinoceros, and are the only lizards possessing them. Their peculiar feet, resembling the talons of an eagle, are another unusual characteristic. This enormous lizard is very fierce, even in captivity, and nature has armed it with sharp teeth and a strong, swiftly



Native with Captured Giant Iguana: The Dog at the Native's Feet Is of Very Gentle Disposition, but Assists with Enthusiasm in the Hunt

striking tail. When thoroughly roused, the rhinoceros iguana presents an alarming spectacle. Opening wide its large jaws, it reveals a mouth lined with glistening black skin and rimmed with short, sharp teeth which are reinforced by two great crushers set far back in the roof, while its round, white tongue lies at the bottom like a marble. Its dull eyes flash with rage, its tail lashes rapidly, and it sometimes rises to such a pitch of fury that it leaps directly at its enemy.

At the Other End of the Line of Reptiles Found in Haiti Stands the Minute Tree Frog, Here Shown Sitting on the Tip of a Man's Finger. Below, at the Right, Are Two Specimens of the "Poison-Gas Frog," Turned Over on the Back to Show the Sucking Disks on Their Toes, Which Enable Them to Run up a Tree as Easily as a Fly up a Wall

This strange lizard comes from a strange place. Doctor Noble found it on an island near Santo Domingo which was situated in a salt lake 160 feet below the level of the sea. The island was uninhabited except for reptiles, and these completely overran it. Although the native dog is a frail-looking creature, it is the only one which will go near the hideous iguana. Oddly enough, however, it enters into the hunt with much zest and shows great courage in tracking down and holding the smaller lizards until the hunter arrives. The larger lizards are "too much" for the dogs, and they are usually shot by the hunter after they have been rounded up. At times an imprudent dog will even follow an iguana into its cave, but backs out swiftly, badly scratched and bitten, and yelping its chagrin. Moreover, a dog which has once been attacked by an iguana usually loses its nerve and is of no further value in hunting.

The minute tree frog, which is so small as to be scarcely visible on the tip of a man's finger, is a neighbor of the rhinoceros iguana. The bottom of a pill box would seem like a large ballroom floor to several of these tiny frogs, seated in it. Yet, incredible as it may seem, its loud, bold note can be heard at a distance of almost half a mile.

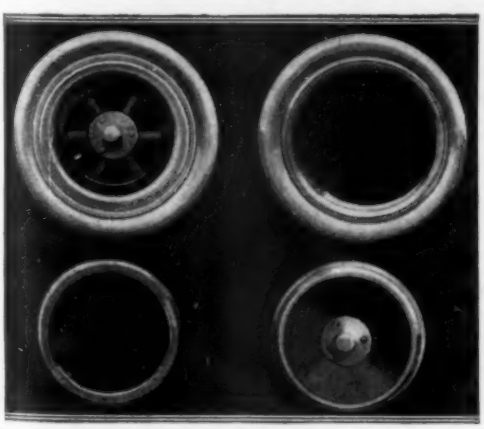
Doctor Noble captured two other kinds of tree frogs which are the first of their species ever brought to this country. For want of better names, they have been called the "barking frog" and the "poison-gas frog." The barking frog is heard only at night, when it climbs high up in the trees and barks loudly. One frog was traced by its barking, and a photograph was taken at the instant a flashlight was turned on it. Later, when an attempt was made to seize it, it startled its captors and proved its versatility by open-

ing its mouth and squealing like a pig. This in itself was an unprecedented performance, as every other species of frog keeps its mouth closed in making sounds. The barking frog seems to start life with the firm intention to be original, for its first act is to emerge from its shell a fully-formed frog, evidently disdaining the tadpole stage through which other species pass.

But Doctor Noble's most spectacular capture is the poison-gas frog. This weird, nightmarish version of our modest little domestic tree toad is as much a giant among its kind as is the rhinoceros iguana, for it attains a weight of 10 pounds and is larger than any tree frog known. Owing, possibly, to the snake-ridden character of its habitat, the poison-gas frog is supplied with protective devices unheard of among land animals. Its toes are supplied with disks, or suckers, which enable it to run up a tree as easily as a fly runs up a wall. The legs are extraordinarily long—twice the length of the body. Thus it is able to make long jumps from one branch to another, even leaping straight into the air, at times, to reach upper branches. Its most unusual means of defense, however, is the ability to eject in times of danger, a corrosive, volatile secretion which envelops it like a cloud, and at the same time chokes and burns its enemy.

## IMPROVED DEMOUNTABLE RIM FOR MOTOR-CAR WHEELS

An improved motor-vehicle wheel, with a demountable rim that can be installed without the use of lugs or bolts, is about to be placed on the market. Around the outer face of the felly of the wheel, just beneath the rim, there is an annular groove nearly half the thickness of the felly and about a third of its width. Around the top of the felly is an encircling metal band, flanged at one end, and stepped down at the other to fit into the bottom of the groove. On this felly band fits the rim, which may be of the straight-side or clincher type to accommodate the tire. The flange on the felly band holds the rim on one side, and it is clamped on the other side by a similar flange on a ring that tightly fits the felly groove into which it is driven. A wheel thus equipped presents a very neat appearance.



Illustrating the Assembly and Parts of a New Demountable Rim That can be Applied or Removed without Bolts or Lugs

## SIX-FEET-LONG TURNBUCKLE MADE WITHOUT A WELD

Turnbuckles of great length, such as are used for tightening the guy ropes on

Weldless Turnbuckle, Over 6 Feet Long, Made as a Solid Forging of Uniform Strength, and without the Element of Unreliability Resulting from Welds

derricks, are now being made weldless. Hitherto, the presence of welds in each head has been the cause of an element of unreliability, and possibility of failure, which in the case of a derrick in operation has often had disastrous results. The weldless turnbuckle, in lengths of 6 feet and over, is a solid forging without welds, and, therefore, exceptionally strong.

## ELECTRICAL SHAVING OUTFIT HEATS WATER IN CASE

An electrical shaving outfit which heats water in the same small case that holds

Above: Shaving Outfit, the Case of Which Is an Electric Water Heater. Right: Appliances Neatly Packed in Case

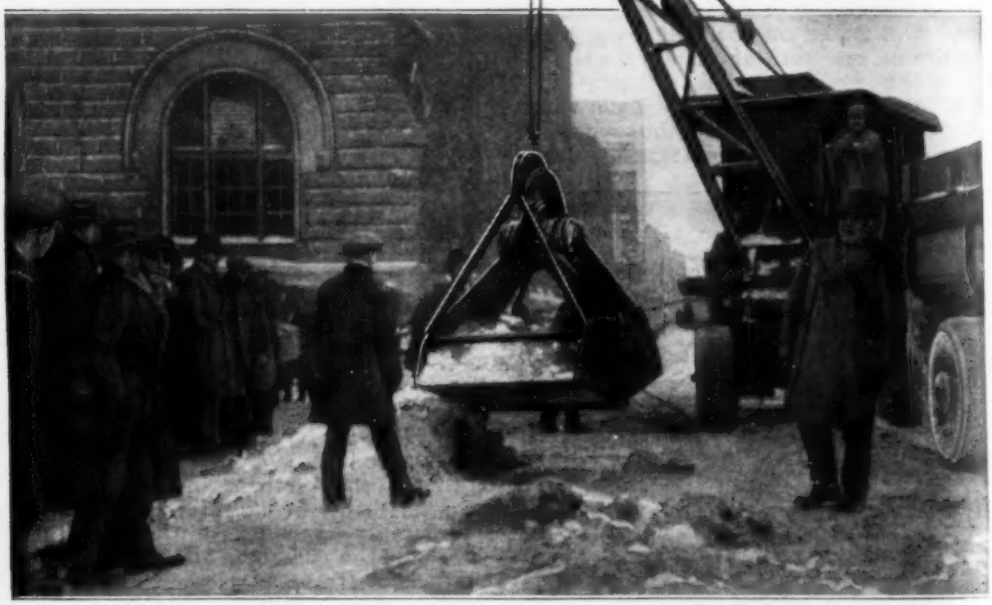
the brush and soap in nickelplated tubes, a beveled mirror, safety razor, and extra set of blades, is now available. When these accessories have been lifted from the case and water placed within it, an extension cord carrying either 110, 150, or 220 volts, is attached to the proper combination of contacts of the heating element in the lower half of the case, and the water is raised to the desired temperature in one minute.

## FRENCH TRY NEW MACHINE FOR PRINTING STAMPS

A machine that prints, perforates, numbers, cuts, counts, and makes up into bundles 3,000 sheets of 100 stamps, each hour, has recently been installed by French postal authorities. In the Bureau of Printing and Engraving similar work is done with several machines, one printing and gumming the stamps while others are engaged in perforating and cutting them into sheets. With the exception of the gumming, which is done beforehand, the French machine combines all these steps and, as may be expected, turns out the finished product at less cost. Only two operators are required, while as many as 12 were needed previously.

## CITY SNOW-REMOVING CRANE HAS SPECIAL BUCKET

A crane and bucket, mounted on a motor truck, is used to load piles of snow onto trucks in New York and Detroit. Besides lessening the number of men needed for this work, the crane permits the sides of the trucks to be built higher, thereby increasing their carrying capacity. The bucket itself is made with extra-wide jaws



Cranes of This Kind with Extra-Wide Buckets have been Found Useful in Loading Street Piles of Snow onto Trucks in New York and Detroit. It is Estimated That Three of the Regular Five-Ton Trucks can be Loaded by This Method in 10 Minutes

and holds a cubic yard of snow. It is stated that the crane has loaded three 5-ton trucks in 10 minutes.

## STUMPS MADE INTO PAPER BY NEW PROCESS

In order to utilize pine stumps on cut-over and burned-over timber lands in the South, a process has been devised that converts this material into acceptable grades of paper. The stumps are first put through a machine that removes any charcoal that may be on them, and then go to machines that cut them into small chips. The tar, turpentine, and resin are next extracted, and the residue converted into a pulp from which the paper is made.

## SPIRAL GRINDING MACHINE FOR MOWER BLADES

For sharpening any size of lawn-mower blade, a recently patented spiral grinder is composed of a motor-driven emery wheel mounted on a table that moves along guides on top of the supporting base of the machine. Brackets connected to this base have means for holding the lawn-mower cutters without removing the reel, so that the emery wheel of the grinder lines up with the cutter blade of the mower. Between the emery wheel and the mower blade, there is an engagement which, as the grinder moves along on its guides, causes the blade to revolve, and thus the grinding wheel traverses the entire length of the blade.

Machine for Grinding Any Size of Lawn-Mower Blade, Large Units of Which can be Set in the Machine and Ground without Removing the Reel

## EIGHT-STORY OFFICE BUILDING BUILT HALF AT A TIME

A new office building being erected in Detroit has one half already occupied while the other half is still under construction. For various reasons, it was decided that completing and fully equipping the corner half would be a better plan than to wait until the whole building was ready for interior finishing. This unusual arrangement enables the owners to realize an immediate return on the offices of the completed section.

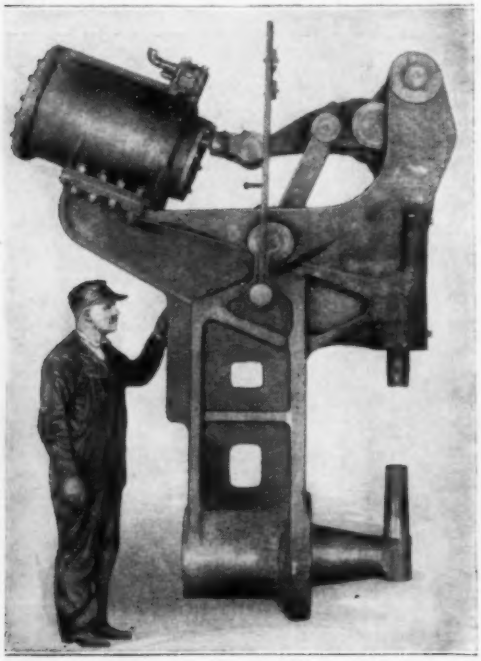
The Left Half of This Building is Completely Finished and Occupied by Tenants, While the Second Half Is Still under Construction

## BUFFALO HERD IN CANADA "GROWING TOO LARGE"

Because the buffalo herd in the National Park at Wainwright, Alta., is "growing too large," sportsmen in the vicinity are anxious that an open season on buffalo be declared next year. It is said that the plan has been suggested to the National Parks Board, and that favorable action is expected. A somewhat similar arrangement proposed for this year fell through, when it was found that the animals were suffering and losing weight from the unusually cold weather. The herd, reputed to be one of the largest in existence, numbers more than 8,000 and is increasing rapidly.

## PORTABLE RIVETER WORKS THROUGH MANHOLE

A portable riveting machine, designed for driving up the last heads in boilers



Portable Riveter, with a Capacity of 100 Tons, Designed for Driving Up the Last Heads in Boilers through the Manhole

through the manhole, has recently been put on the market. The machine has the form of a large "Y," with the pneumatic actuating mechanism extending from the left to the right arm, and the stake running parallel to the leg. The dies are vertically arranged, and the machine rocks about a point near the center of gravity. The reach of the unit is from 14 to 18 inches; the gap 35 inches; cylinder diameter 18 inches, and the die stroke 5¾ inches. The capacity is 100 tons, and the weight about 9,000 pounds.

## RUBBER "GLASS" ONE OF NEW LINE OF PRODUCTS

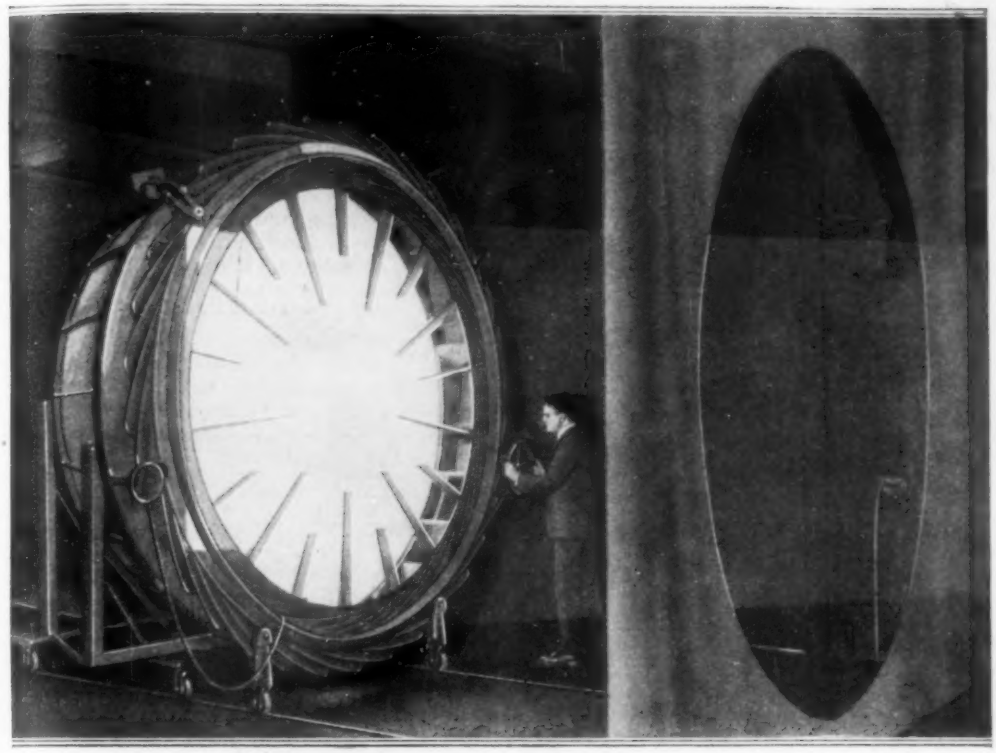
Rubber "glass," or transparent rubber, is one of an interesting number of new products that have recently been developed as the result of a discovery of a compound which permits ordinary commercial solutions of rubber and celluloid to form a permanent mixture. About 10 per cent of rubber in celluloid results in a very resilient product, and about 10 per cent of celluloid in rubber produces a substance having relatively high tensile strength and waterproof qualities. The rubber in the mixture can be treated, by a special process, to any degree of vulcanization without impairing the transparency of the product. Any desired color can be had by the aid of coal-tar dyes. Great possibilities are suggested in the way of surgical rubber goods, hot-water bottles, bathing caps, windows for motor vehicles, and the like.

## FEDERAL-AID ROAD SYSTEM NEARLY OUTLINED

In outlining the 187,000 miles of road comprising the Federal-aid system of highways, it has been arranged that not more than seven per cent of the total road mileage of any one state be included. Not to exceed three-sevenths of this will be designated as primary or interstate highways, and the remainder secondary or intercounty highways. The plans cover a 15 to 20-year construction program, with provision for enlargement at the end of that time.

## PISTON-CENTERING MACHINE IS RAPID AND ACCURATE

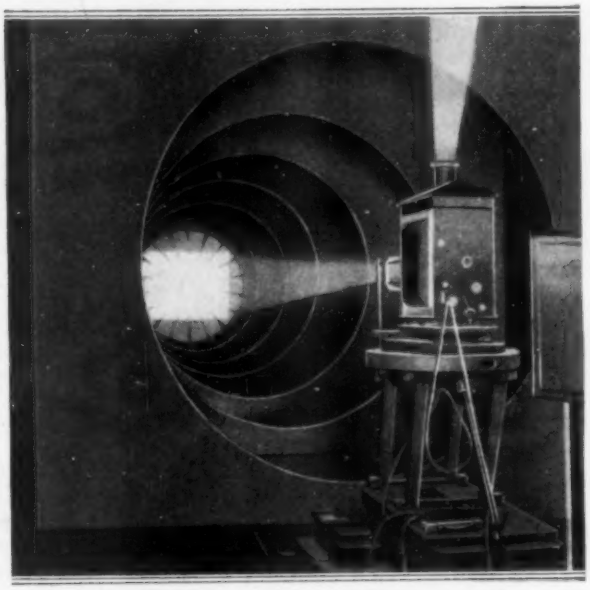
A machine in the form of a compact drill press specially designed for centering engine pistons, and adjustable to any size of casting up to 6 inches, is now on the market. On the horizontal circular table of the machine are four vertical, adjustable fingers. Over these the casting is slipped with a loose fit, and then, by turning a disk gently to the left, all four fingers expand till they bear lightly on the casting walls. On an arm above the piston is the drill spindle, which is pulled down by a lever, and the piston is accurately centered by the drill. The machine is then in condition for centering any number of similar castings, without further adjustment. The machine can also be used as a speed drill.



Close-Up of the Photometer, Which is Mounted at the End of the Tunnel to Measure the Light Received from a Motion-Picture Projector: The Radial Prongs, Extending Inward from the Shutter Ring, Are Black, and Serve to Correct Certain Optical Effects

## MOTION-PICTURE PROJECTORS TESTED IN TUNNEL

Projecting the light through a long tunnel, formed by a series of circular curtains mounted on rollers, onto a photometer, or illumination measurer, placed at the end, was the method recently employed in testing the light output of a motion-picture lamp. Formerly the intensities of illumination were measured in various parts of the beam, a process requiring frequent re-



How the Projector is Set Facing the Tunnel: The Photometer and Curtains are Mounted on Rollers So That the Tunnel may be Adjusted to Various Lengths

trials before accurate data can be obtained. With this new arrangement, it is said to be possible to determine, at one time, the entire effective output of a motion-picture lamp under conditions similar to those found in theaters. The photometer, as well as the curtains, is mounted on rollers, and can be moved 150 feet from the lamp. In the test, it was placed 65 feet away.

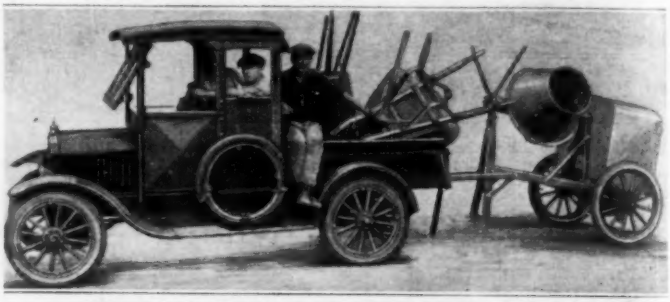
Greek Women Doing the Family Washing in Stone Sarcophagi Over 2,000 Years Old, near Khasia

## GREEKS USE ANCESTRAL TOMBS AS WASHTUBS

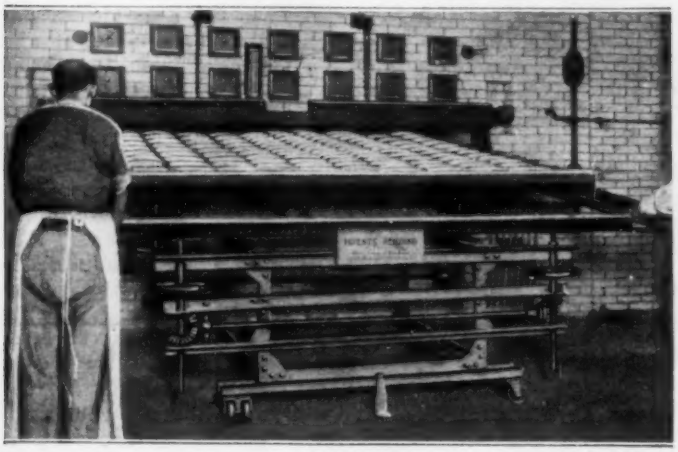
Near Khasia, a little village 10 miles northwest of Athens, Greek peasant women do their washing in stone sarcophagi that are at least 2,200 years old. Washtubs of any kind, owing to the scarcity of wood and metals in Greece and the poverty of the peasants, are rarely to be seen in the country villages, and, for this reason, the women of Khasia, possessors of these ready-to-hand washtubs, are doubtless greatly envied by their less fortunate sisters in the neighboring villages who wash their clothes in the stream.

## CONCRETE MIXER HAS RUBBER-TIRED WHEELS

A new concrete mixer, now being offered for contractors' use, is mounted on a rubber-tired two-wheel truck so that it can be easily and quickly moved from one job to another. Whereas the usual portable type of mixer cannot be hauled faster than about 10 miles an hour, this one will trail behind a light auto truck at a speed of 30 miles an hour. A leg, set on the ground when the mixer is in use, supports it in a level position. It travels noiselessly and without jarring, and is no hindrance to traffic.



Concrete Mixer Mounted on a Rubber-Tired Two-Wheeled Truck, Which can be Hauled behind an Auto Truck at a 30-Mile Pace Instead of the Usual 10 Miles an Hour



Showing How the Removable Tray, Accommodating 200 Loaves of Bread, is Rolled into the Oven from the Truck on Which It is Wheeled about the Shop Interior

## WHEELED TRAY AND TRUCK FOR BAKERIES

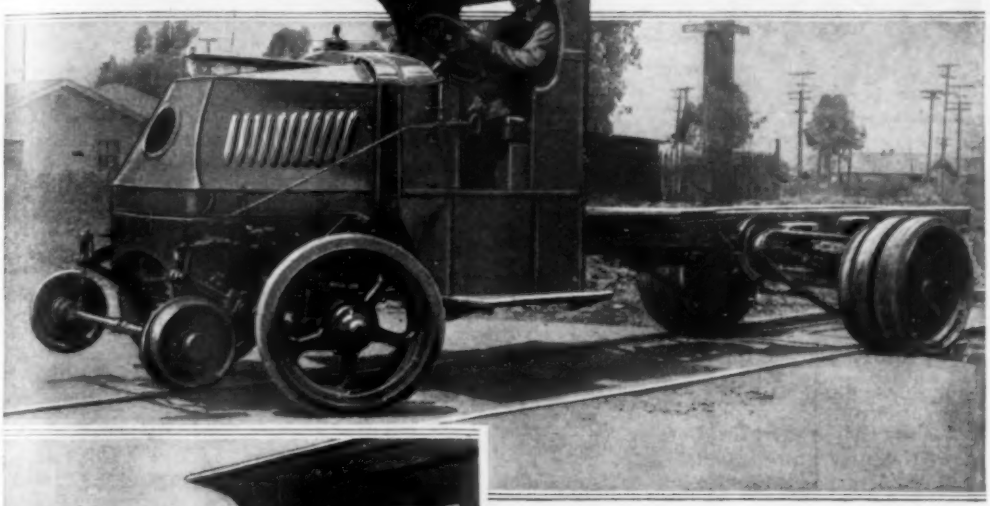
A special removable tray, accommodating 200 ordinary-sized loaves of bread, has been designed for use in bakeries. The tray may be readily rolled into or out of the oven on angle-iron "tracks" installed at each side of the baking compartment, while a truck having an attachment for adjusting the tray to the level of the oven opening, carries the heavily loaded container about the shop interior.

# TRUCK RIDES RAILROAD TRACKS OR HIGHWAYS

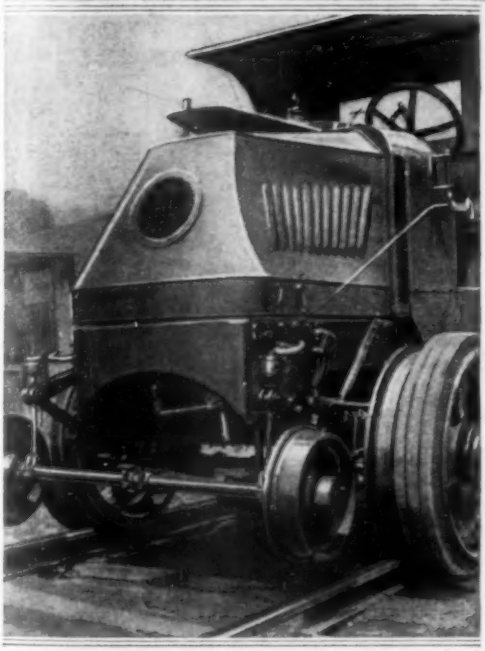
A big auto truck has been recently developed which runs with equal ease on railroad tracks or smooth highways, and turns from one to the other without difficulty. For rail travel, its wheels are equipped with flanges inside of the rubber tires, and a special pilot truck is arranged in front, which, when let down to the rails, locks the steering mechanism. When about to leave the track, the pilot is raised, automatically disengaging the steering apparatus, so that the driver can turn the front wheels and run onto the highway, without stopping or otherwise interfering with the travel.

The pilot wheels are carried in front of the front axle and attached to it by a ball and socket joint. When these wheels are lowered onto the rails, the lifting device automatically applies tension through four coil springs, making it impossible for the wheels to bounce off or leave the rails while in motion. When the pilot wheels are engaged with the rails, an automatic device locks the standard steering gear in such a way that the pilot entirely controls the truck front wheels. By using this method of control, it is possible to pass frogs, switches, and highway crossings without any danger of the truck getting out of alinement with the rails while riding on the rubber tires.

In the attachment of the pilot, the possibility of its breaking and dropping down on the highway while the truck is traveling has been carefully considered, and provision made for the truck to be steered in the ordinary manner.



The New Double-Duty Motor Truck Running off the Track and onto a Smooth Road: The Lifting of the Pilot Wheels Unlocks the Steering Mechanism of the Motor Truck



Front End of Motor Truck with Pilot About to be Lowered for Rail Travel: Four Coil Springs Hold the Pilot Wheels in Engagement with the Rails, After They have been Lowered

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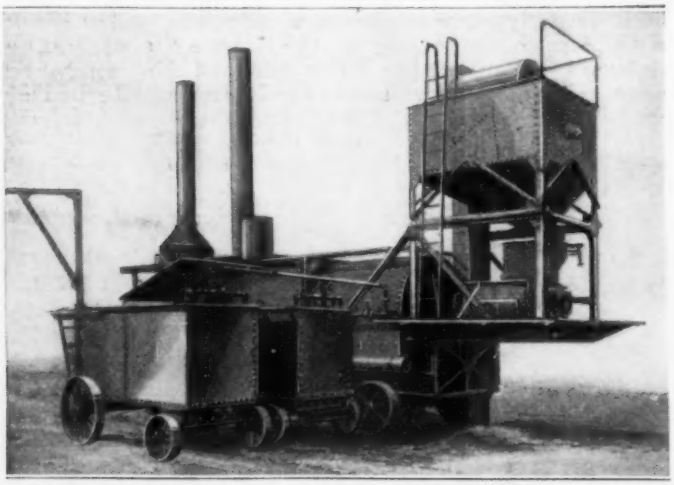
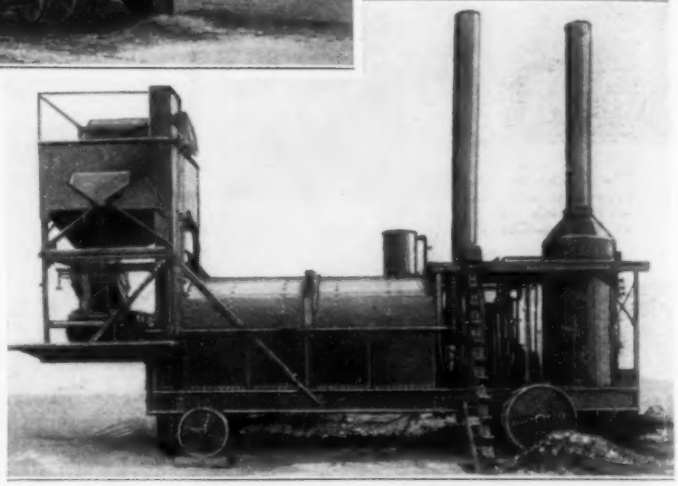
¶A motion picture showing the advantages of Philadelphia as a seaport has been prepared by that city and will be distributed throughout the country.

## PORTABLE ASPHALT PLANT BUILT IN THREE UNITS



A New Portable Asphalt Plant in Which the Power Plant and Drier Form One Unit, and Two Kettles Are Separate: The Kettles are Heated by Means of Jointless Steam Coils

A portable asphalt plant recently announced is designed so that the drier and power plant, and the two asphalt kettles are built as separate units. The kettles have a capacity of 2,500 gallons and are heated by jointless steam coils, which prevent damage to the asphalt likely to occur with open fire. The three-compartment sand bin holds 10 tons. Sand containing not more than two per cent of moisture will be heated to 350° F. at the rate of 120 tons a day by the drier, which has three drums, giving the effect of one continuous drum. The plant, which also includes a chain-driven pug mill of 1,000 pounds' capacity, will prepare the asphalt for over 1,000 square yards of 2-inch top in an eight-hour day.

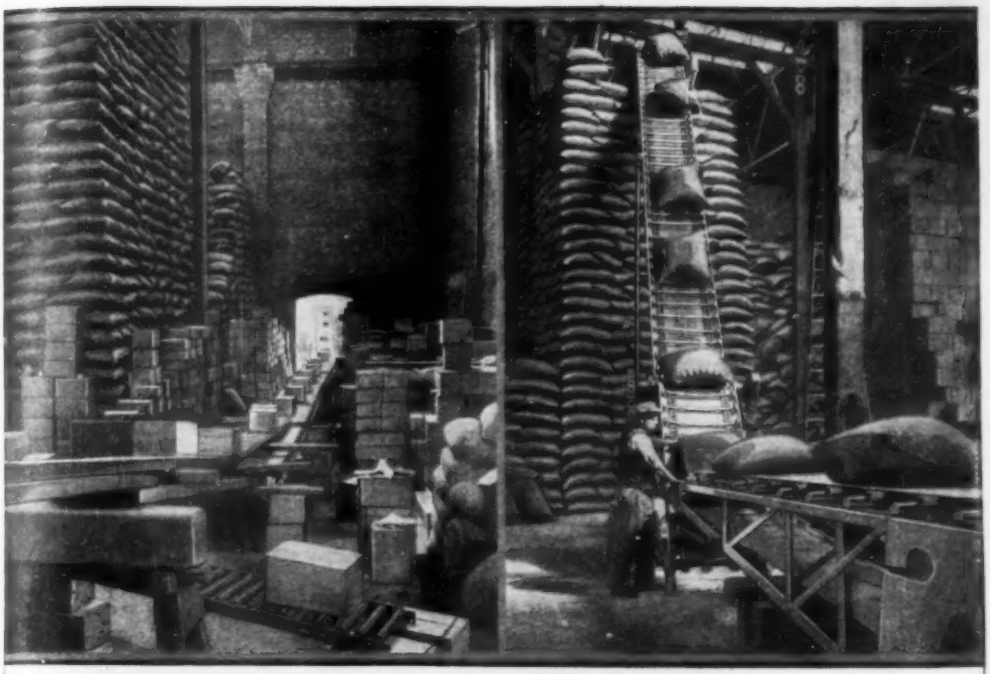


View of the Power Plant and Sand-Drier Unit: The Three-Compartment Bin Holds 10 Tons of Sand, and the Three-Drum Drier will Handle 120 Tons of Sand a Day

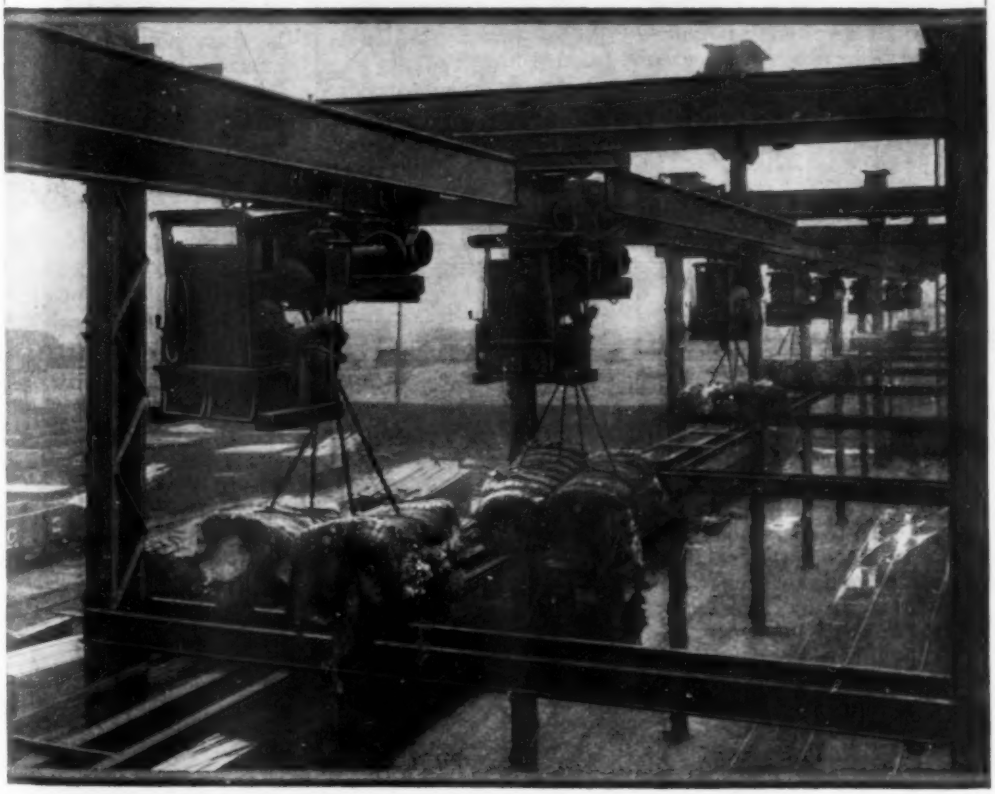
## EFFICIENT DOCK EQUIPMENT AT MANCHESTER

By MAJOR JOHNSTONE TAYLOR

THE inland city of Manchester, Eng., has dockage for the largest ocean-going vessels afloat. This, as is well known, is made possible by the $60,000,000 ship canal, opened in 1894, that connects the city with the sea, 35 miles away. During the last 28 years Manchester has gradually developed from an inland city to the third largest seaport of the United Kingdom in point of tonnage. This has resulted, as much as from any one thing, from the unwavering policy of dispensing with any manual handling of goods. The 44 warehouses of the port can accommodate 500,000 tons of perishable goods, besides 500,000 bales of wool, 100,000 bales of cotton, 40,000 barrels of liquor, and 4,000 tons of tobacco, and they have 1,000,000 cubic feet of cold-storage capacity. All antiquated methods of handling this vast quantity and variety of goods have been from the first avoided, and in their place have been adopted the most modern mechanical means, such as electric cranes, belt conveyors, gravity runways, overhead cranes, and electric and pneumatic hoists. In unloading a shipment of American cotton, for instance, a series of overhead electric traveling cranes, each with an operator in its



The Docks at Manchester are Fully Equipped with Modern Labor-Saving Devices, Many of Them Ingenious and Unfamiliar to the General Public. Above, to the Left, is Shown a Gravity Runway with Which Cases are Lowered from the Piles to Railroad Cars or Trucks, While on the Right Is an Endless-Chain Arrangement Used in Stacking. Below are Shown Some of the Cranes Used in Transporting Bulky Loads



cab, hoist the bales from the cars, and travel rapidly to the storage warehouse, where the bales are dumped conveniently for arrangement by hand. Meat going into cold storage is handled similarly. Sacks of all kinds of goods are unloaded from the railroad cars onto a conveying belt, which carries them rapidly to the interior of the warehouse, and then, with an adjustable hoisting extension, deposits them in piles of any required shape or height. Wooden boxes or cases are conveyed on roller runways by gravity, and are then transferred to belt conveyors that deliver them for loading onto railroad cars.

There are many other ingenious and efficient means of handling freight with the greatest facility and dispatch, all of which have made it possible for a new inland port to surpass all but two of the largest and oldest seaports of the United Kingdom, and to place it in the ranks of the largest.

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¶Total savings deposits in the United States at the end of 1922, were $1,500,000,000 greater than on Dec. 31, 1921.

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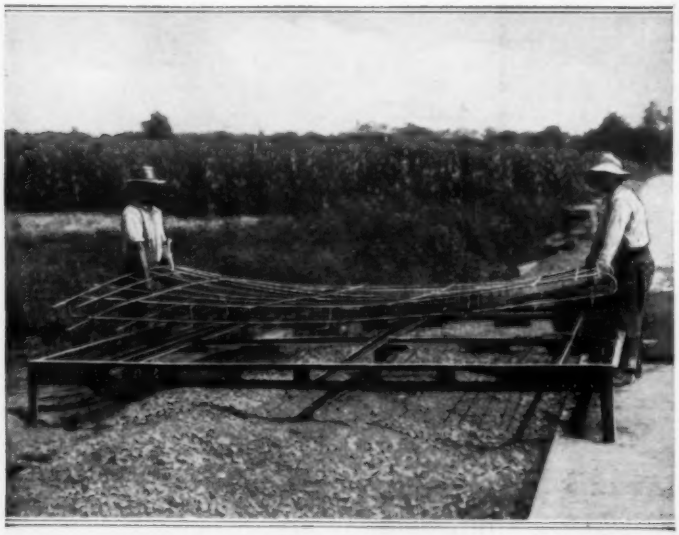
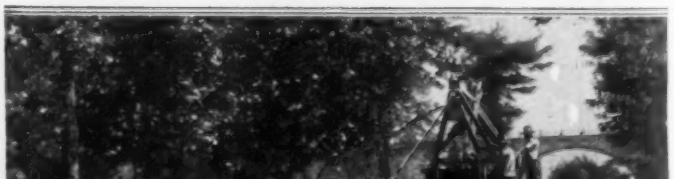
## STEEL MATTRESSES REINFORCE CONCRETE ROADS



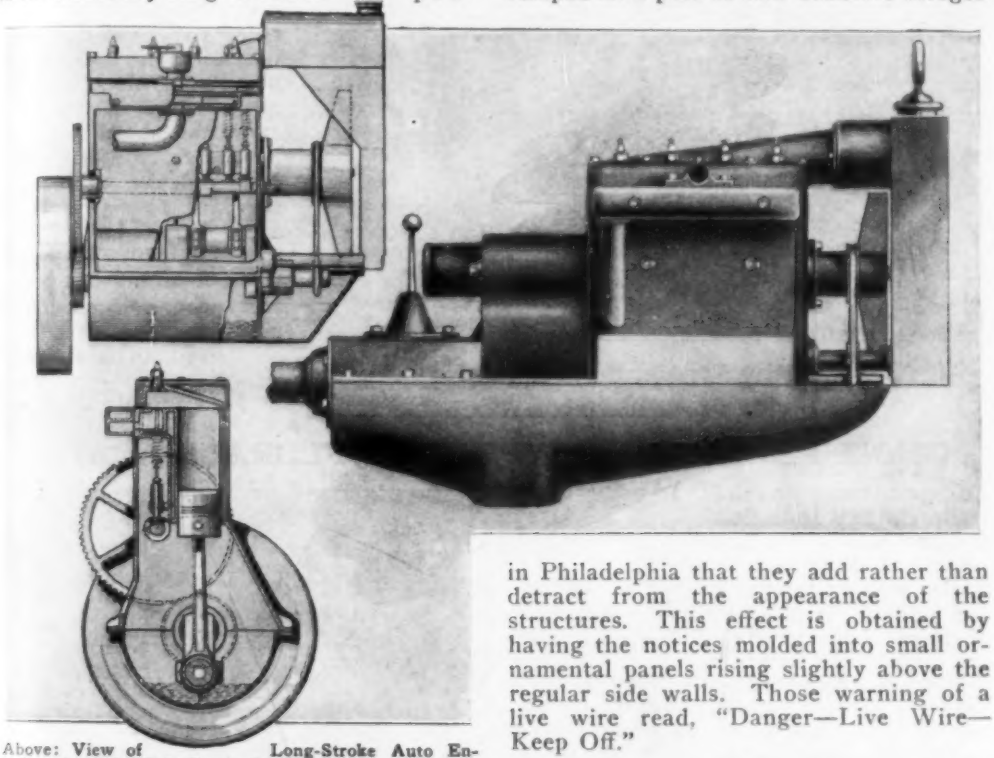
The Illustration Above Shows One of the Mattresses About to be Laid on the Roadbed. At the Right Is a View of Another Section of the Road After the Frames have been Filled with Concrete. The Workmen in the Foreground are Leveling the Surface with Boards in the Usual Way

In concrete-road building a new method of making the reinforcement is said to have been found to be economical, and effective in preventing damage by frost. After the road has been dug up for a depth of about 10 inches, and its surface rolled smooth, a large rectangular steel frame is placed above it. Upon this are laid a series of looped steel bars, all parallel and equally spaced. Other steel bars are laid across the upper and lower sides of these looped bars, and are wired to them, thus forming a rigid mattress of reinforcing bars. This is placed on the dug surface of the road, followed by others made in the same way. The concrete is then poured and the surface leveled off with boards in the usual way. It is said that the mattresses are not expensive and that little time is sacrificed, in view of the improvements gained by their use.



## LONG-STROKE AUTO ENGINE OF EASY ACCESSIBILITY

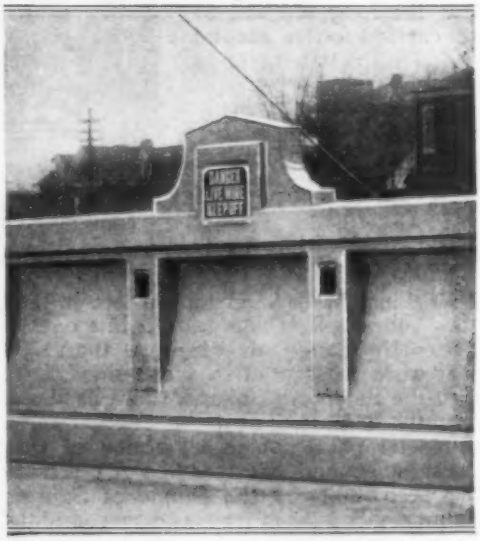
A new automobile engine has several novel features of design, one of which is its unusually long stroke in proportion to the bore, accompanied by means of restricting the inlet valve so that the charge fills the cylinder at less than atmospheric pressure. This results in more complete expansion, with lower temperatures and greater facility for cooling. One of these new engines, that has been demonstrated in an automobile over several thousand miles of travel, has four cylinders with a 3½-inch bore and 7-inch stroke, which develops 25 brake horsepower at 1,500 revolutions per minute. It is said to have proved to be economical in fuel consumption, and to have been always very easily cooled. An outstanding feature of the design is the means of accessibility. It is of the L-head type, entirely inclosed in a rectangular case, the whole of which on the valve side is easily removable. All the valve tappets and guides can then be taken out at one time, making it exceptionally easy to attend to the operating parts of the engine.



Above: View of Long-Stroke Auto Engine with Side Walls Partly Cut Away. Below: Cross-Sectional View. Right: Engine Fully Inclosed

## WARNING SIGNS MADE PART OF BRIDGE STRUCTURE

Signs warning of the proximity of live wires or other dangers are so neatly developed as a part of new concrete bridges in Philadelphia that they add rather than detract from the appearance of the structures. This effect is obtained by having the notices molded into small ornamental panels rising slightly above the regular side walls. Those warning of a live wire read, "Danger—Live Wire—Keep Off."




Attractive Warning Signs of This Kind are Made a Part of New Reinforced-Concrete Bridges being Built in Philadelphia

## NEW SUBSOIL PLOW OPERATED BY SMALL TRACTOR

Subsoil-Plow Attachment Adapted for Use in Connection with Small Tractors, Which can be Adjusted to Pass over Obstructions and for Depth

A new subsoil plow for use in breaking up the hardpan that forms where there is continuous irrigation, and adaptable to small tractor operation is now being manufactured. It has the advantage that it can be easily raised and lowered by the tractor driver by means of an oscillating standard to which it is attached. The depth adjustment can be made without taking the point from the soil, and the point and standard can be raised to clear obstacles.

## GIANT PEACOCK WINS PRIZE IN FLORAL PARADE

A gorgeous peacock made entirely from flowers, and so large that it had to be carried on two floats, won first prize in the annual Tournament of Roses held at Pasadena, Calif. In its plumage were represented nearly a score of different colors, while the body itself was so big that the long tail had to be carried on a second float, following quite a distance behind the first. The neck of the "bird" extended as high as the telegraph poles bordering the line of march.

This Giant Peacock Won First Prize in a Recent Floral Parade Held at Pasadena. It was Made Entirely from Flowers

## FLORIDA PARK COMMEMORATES INDIAN MASSACRE

Marking the battleground where in 1835 Maj. Francis L. Dade and all but one of his entire command of more than 100 men were massacred in a one-sided fight with the Seminole Indians, there has been recently dedicated near Bushnell, Fla., a memorial park named in honor of this commander and his troops. An attractive arch, built by the people of Sumter County with stones from the surrounding country, forms an entrance to the grounds, while inside is a monument topped by a bronze figure of an infantryman of the time, and a three-sided breastwork of logs, arranged on the exact spot where the last stand was made. The troops were en route from Fort Brooke, Tampa Bay, to Fort King, when, almost without warning, the Indians, 1,400 strong, swooped down upon them. Warlike, well-armed, and finding ample protection in the hummocks and palmetto thickets of the country, they had little trouble in overcoming the small band of soldiers, of whom only one man escaped to tell the story.

The Arch Which is Shown Above was Built by the People of Sumter County, Florida. It Is at the Entrance to a Park Recently Dedicated as a Memorial to Major Dade and His Command, All Except One of Whom were Massacred Close By in a Battle with the Seminole Indians, in 1835. The Stones Used were Collected from the Surrounding Country. To the Right is Shown the Monument Erected within the Park in 1922. The Figure Is That of a Soldier of the Time, and is Done in Bronze. Below is Given a View of the Breastworks Marking the Exact Spot Where the Last Stand was Made. The Logs Are of Concrete, Colored to Resemble Wood

## MONSTER SMOKESTACK STANDS 257 FEET IN HEIGHT

A monster smokestack which stands 257 feet in height, thus taking rank among the tallest in the country, has recently been completed for the University

Reinforced-Concrete Stack, 257 Feet High, Recently Completed for the Power Plant of the University of Kansas

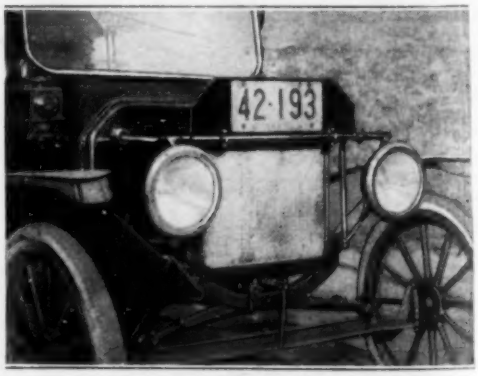
of Kansas, at Lawrence. The reinforced-concrete stack was erected to serve the new heating and power plant recently completed at a cost of $300,000. On a clear day it is said that Topeka, some 40 miles west, and Kansas City, about 46 miles east, can be plainly seen from the top. The square brick stack of the old power plant, built in 1908 to a height of 127 feet, then considered great, is entirely overshadowed by the new chimney. It will furnish draft for eight boilers having a combined rating of 2,100 horsepower.

## LAWS ASKED FOR PROTECTION OF FLOWERS AND PLANTS

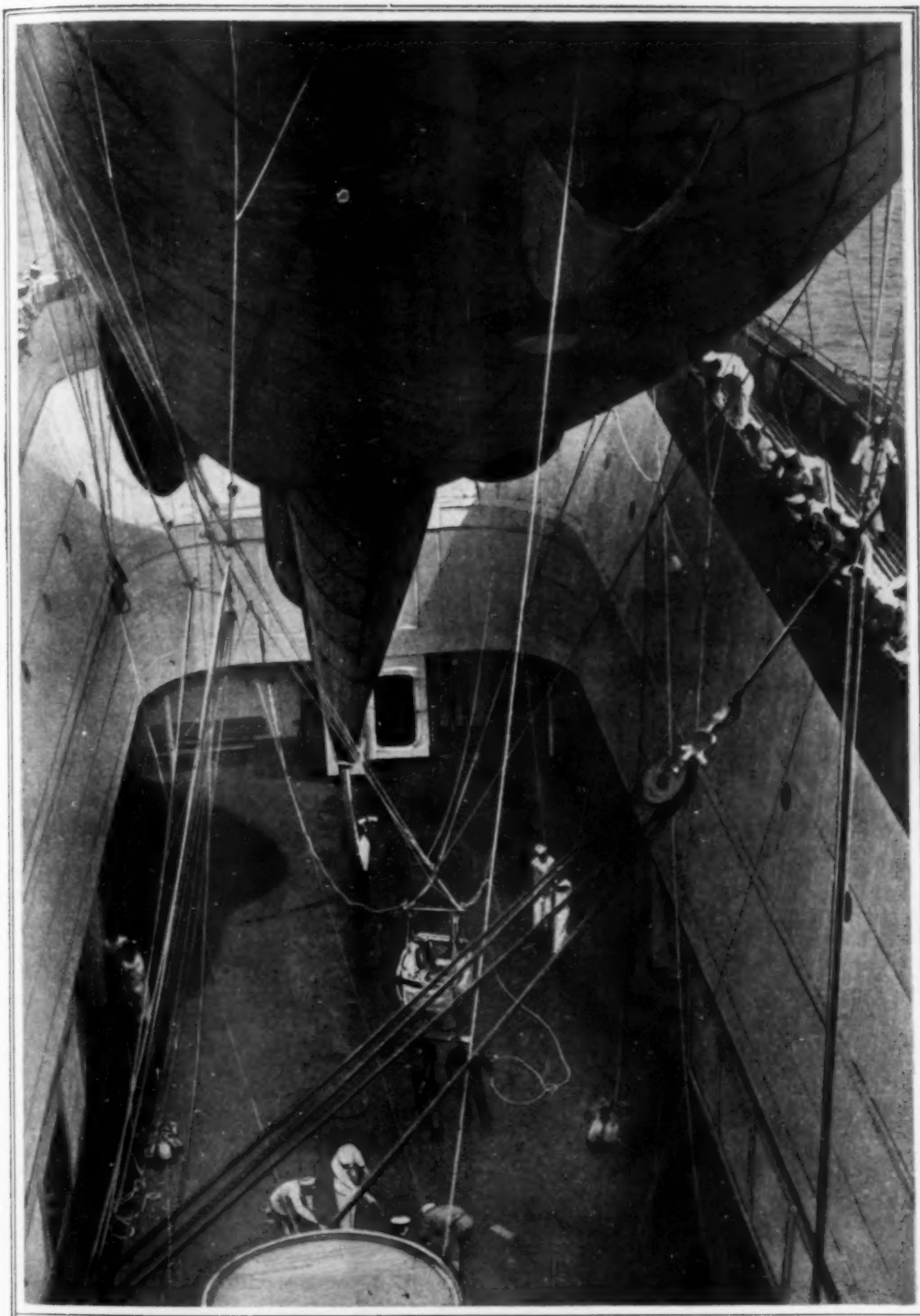
The success of Vermont in preserving wild flowers and plants, as game is protected, and preventing their extinction, has aroused an interest among botanists and lovers of wild flowers which may result in more legislation for their protection. Commercial collectors were found to be responsible for the extermination of wild flowers and rare plants. A law passed by the Vermont legislature prohibits commercial collecting and restricts botanists to two specimens of each plant in a year. The very existence of orchids, arbutus, and rare alpine plants was threatened. Other states are suffering from the same abuse. Such ferns as the climbing fern in Connecticut and the hart's tongue in New York, are endangered by the draining of swamps and the opening of quarries.

## ADJUSTABLE AUTO HEADLIGHT ELIMINATES THE GLARE

A new automobile headlight that eliminates the glare, and throws the light always in one and the same place, has been thoroughly tested with, it is said, very satisfactory results. The lights are automatically adjustable, being fastened to a rod that swings in bearings at each end of the machine. They are counterbalanced by weights that may be slid along an arm to change the center of gravity of the mounting to suit the motorist. When once set, the lights automatically adjust themselves so that in going up or down grade, they throw light directly onto the road, instead of into the air in the former case, or into the eyes of an approaching driver in the latter.




Automobile Headlights Which Automatically Adjust Themselves So That in Going up or down Hill, the Light Is Directly on the Road

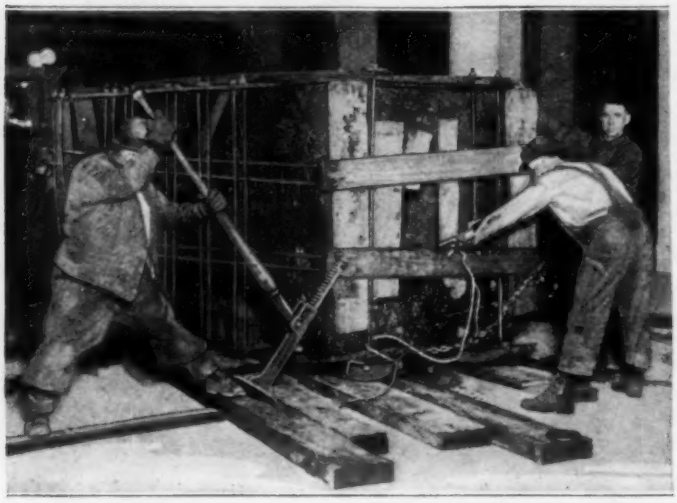


**MOTHER SHIP FOR "BLIMPS" DISCHARGING ONE OF ITS BROOD**

THE above picture shows one of the naval observation balloons being unloaded for transfer ashore from the U. S. S. "Wright," which was converted into a carrier for "blimps." The decks of the ship were cut away so that the hull could receive several seagoing balloons, which have to be carefully bedded down in order to prevent injury to the balloon fabric and permit them to be easily launched into the air.

## HUGE LUMP OF COAL IN UTAH THE LARGEST EVER MINED

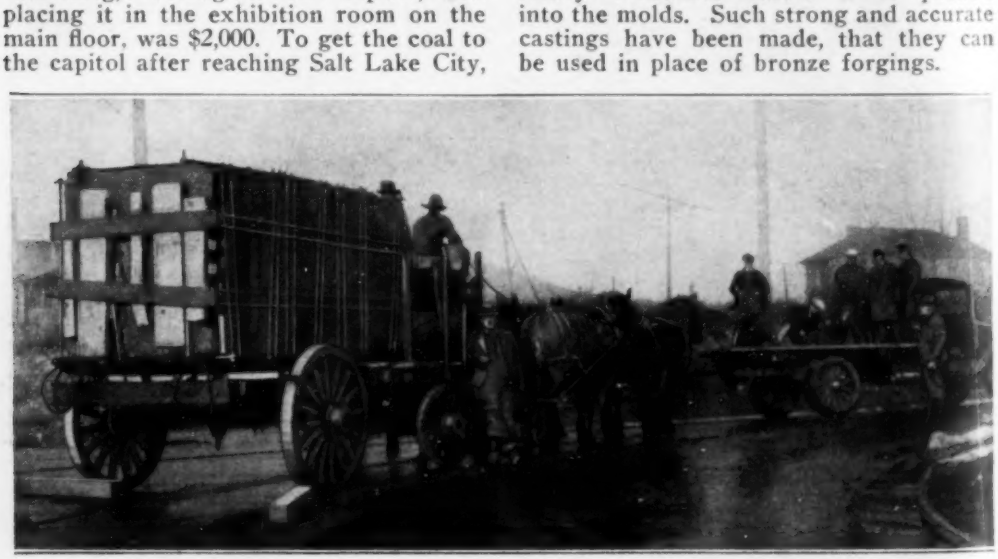
A gigantic lump of coal, believed to be the largest ever mined, has been placed on exhibition at the Utah State capitol. It was taken from a seam 30 feet in thickness and 3,000 feet underground. A machine was used to undercut it, and the ends and back were sheared by hand. The approximate cost of getting out the coal, mining it, loading it, transporting it, unloading, hauling to the capitol, and placing it in the exhibition room on the main floor, was $2,000. To get the coal to the capitol after reaching Salt Lake City, proved to be a difficult job. At first 11 horses were hitched to the wagon on which the coal was placed—five in front and three on either side. As the horses did not possess sufficient strength, the five at the front of the wagon were retained, and a five-ton motor truck was attached to the wagon tongue, while 20 men were used as ballast for the truck. Then the huge sample of Utah's coal fields slowly ascended the Main Street grade to the capitol. The block is 5 feet square by 10 feet long and weighs 22,900 pounds, exclusive of the bands of iron which form its crate.



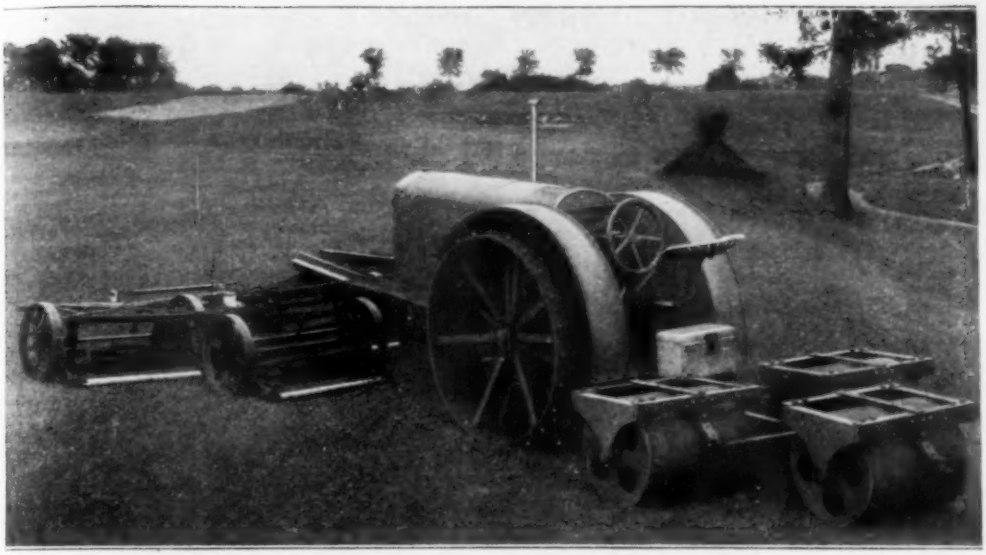
**Huge Lump of Coal, Supposed to Be the Largest Ever Mined, being Placed in Position for Exhibition at the Utah State Capitol in Salt Lake City: It Contains 250 Cubic Feet, and Weighs 22,900 Pounds**

## NEW FURNACE PRODUCES FINE STEEL

A new hearth furnace, recently installed in a German foundry, is reported to turn out steel that produces castings comparable with those obtained from the crucible process. A high temperature is obtained in the furnace by the use of preheated air for mixing with the hot gas from the producers, and the molten steel is run into a large ladle heated nearly white-hot before it is poured into the molds. Such strong and accurate castings have been made, that they can be used in place of bronze forgings.



**Over 11 Tons of Coal in a Single Lump Loaded onto a Wagon in Salt Lake City: To Haul It up the Steep Street Grade to the Capitol It was Found Necessary to Help the Five Horses by Hitching to the Wagon Tongue the Five-Ton Motor Truck, Carrying 20 Men as Ballast**



Combination of Tractor-Driven Roller and Mower That Cuts 80 Acres of Grass a Day on a Golf Course: The Five 30-Inch Mowers Cut a Swath 142 Inches Wide, and Are Flexible Enough to Conform to Irregularities in the Ground

## TRACTOR MOWER AND ROLLER FOR GOLF COURSES

The latest power equipment for maintaining the fairways and roughs of golf courses consists of a tractor from which the front wheels have been removed and an extension frame or wheel truck substituted. The wheel truck is designed so that mowing units and various other implements for work on golf courses can be attached. Five 30-inch mowing units can be attached to this truck at one time, three in line in front and two following directly back of them. These will cut a width of 142 inches and will mow up to 80 acres in a day. An 18-hole course can be "manicured" with this outfit in two days. Rollers can be attached to the tractor and pulled at the same time.

The mowing units can be detached easily and the tractor used for many other kinds of work requiring motor power about the golf course or in city parks. In fact, it is claimed that with this equipment a golf club can eliminate every horse and half of the men required to maintain its course. The tractor travels at a speed of about three miles an hour.

The attachment of the mowing units is flexible so they can conform to rolling ground, clipping the grass on saucer-shaped ground, on the inside of bunker banks, around steep banks, etc. The two end units can be raised and held securely in an upright position for cutting in narrow places or between trees, for transporting over rough ground or going through gates. The outfit is easily operated by one man.

## NEW SHORT PAIR OF BUMPERS PROTECTS REAR FENDERS

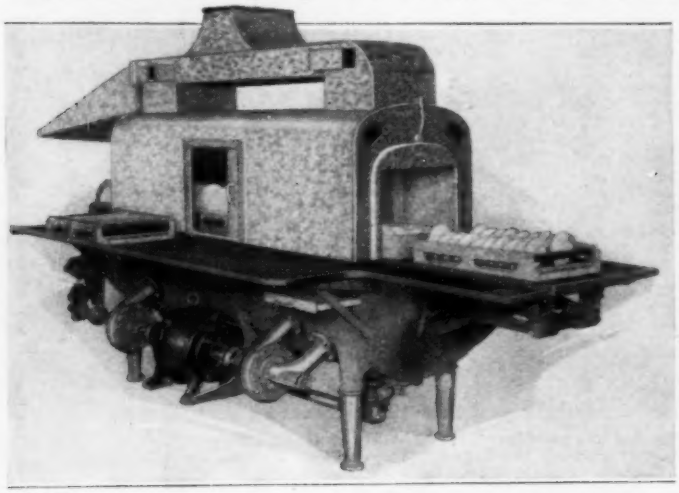
Projecting beneath the rear end of the auto frame to a point beyond the rear fenders, a new set of bumpers has been made to protect the fenders in case of a collision from behind. The bumpers are curved, double strips of metal fastened about the bolts that hold the rear springs to the auto frame. While they afford the same protection as the usual long bumper, they are not in the way of the rear tire carrier or gasoline tank, nor when jacking the car. They are also lighter

Only a Wrench is Needed to Install These Bumpers Which, though Light, Afford Adequate Protection for the Fenders

and less costly than the ordinary rear bumper. Only a wrench is needed to install them.

## DISHWASHER HAS TWO SETS OF PUMPS AND MOTORS

An automatic dishwasher having two independent sets of pumps and electric motors as a precaution against shutdowns during the rush hours, is now available. In operation, an endless belt, driven by either motor, draws a tray or carrier of dishes into one end of the washer every 10 seconds. The dishes remain under a first spray for this period, and are then drawn along until they rest beneath a second spray, where they remain for the same length of time, after which the belt carries them out at the other end of the machine. The trays in which the dishes are placed have wooden frames for the china to rest upon instead of the usual cast-iron kind, thus eliminating one cause of breakage. A large hotel has cut in half its yearly bill for broken dishes by using a machine of this improved type.



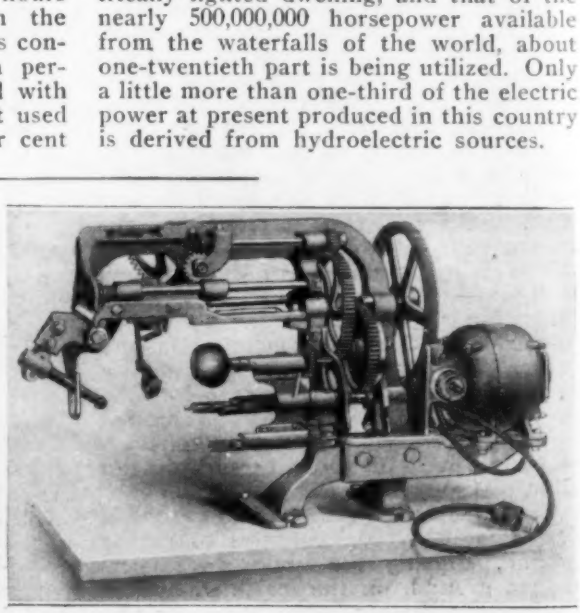
Automatic Dishwasher for Restaurant and Hotel Use, Which Has Duplicate Driving Motors and Pumping Units to Guard against Breakdown, and Wooden Trays to Reduce Breakage

## HALF OF WORLD'S ELECTRICITY USED IN UNITED STATES

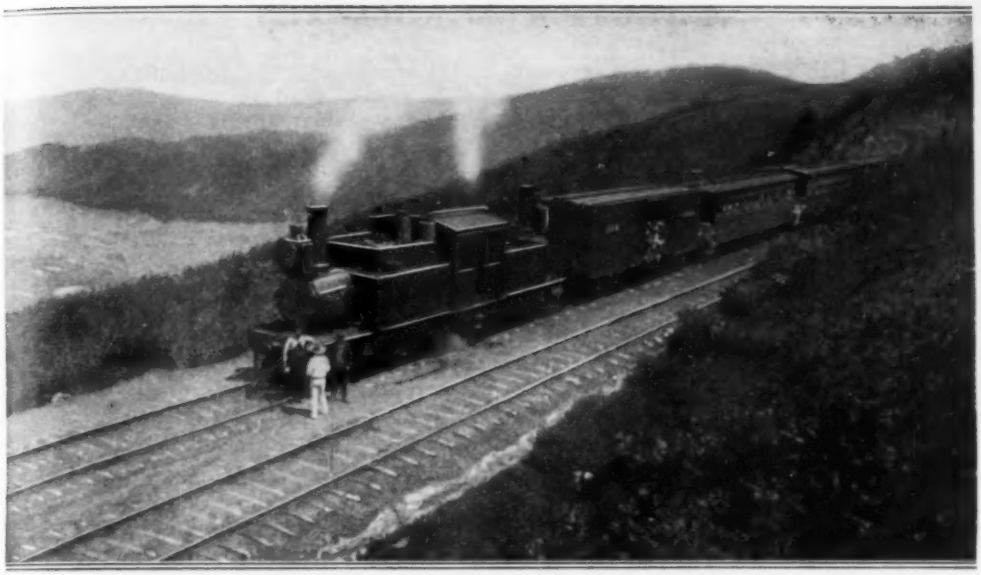
Recently compiled figures show that of the total 115,000,000,000 kilowatt-hours of electrical energy produced in the world during 1920, the United States consumed about one-half but that in per-capita consumption Switzerland led with 700 kilowatt-hours. Of the amount used in the United States, about 15 per cent was for lighting purposes, and the balance for industrial activities. It is estimated that one out of every 16 persons who inhabit the world, lives in an electrically lighted dwelling, and that of the nearly 500,000,000 horsepower available from the waterfalls of the world, about one-twentieth part is being utilized. Only a little more than one-third of the electric power at present produced in this country is derived from hydroelectric sources.

## AUTOMATIC APPLE PARER AND CORER

A new motor-driven machine that represents years of development, is said to core and pare 30 apples a minute, automatically performing all the operations except placing the apple on the holding fork at the start. Three of these forks are provided, and they revolve from the loading position to the one where the apple is cored and pared, and then to the point where the cored and pared apple is discharged. The paring knife operates somewhat like a safety razor and adapts itself to the contour of the apple.



Motor-Driven Machine Which Automatically Cores and Pares 30 Apples a Minute: All the Operator Does Is to Place the Apples on the Holding Fork



A Scene near Alta Luz on the Railway between Mexico City and Vera Cruz: It is Expected Work will Soon Start on the Electrification of 30 Miles of This Mountain Road, Which Is Part of the Oldest Railway System in Mexico

# MEXICO'S SCENIC RAILROAD TO BE ELECTRIFIED

By GEORGE F. PAUL

GREAT interest is attached to the announcement just made by the Mexican Railway Company that it will soon start work on the electrification of 30 miles of single track between Esperanza and Orizaba, on the main line between Mexico City and Vera Cruz.

This is the first main-line steam-road electrification to be undertaken in Mexico, and is on the oldest railway system in the country. On the eastern slope of the mountains the grades run as high as five per cent, and traffic is steadily increasing, making it difficult to maintain service up to standard under present conditions. It has been carefully estimated that results will pay for the entire cost of electrification within five or six years.

A Point above the Clouds on the Railway between Mexico City and Vera Cruz, Which Reaches a Height of 9,000 Feet above Sea Level at One Place: When Modernized, It is Predicted This Route will Be a Favorite with Tourists

The system will be operated by direct current at 3,000 volts. The power is to be supplied by a company which has a modern hydroelectric plant a few miles from the city of Orizaba. For this mountain service ten 150-ton locomotives will be required. They will be interchangeable for freight and passenger service. An automatic substation will be one of the features of the new equipment. The road climbs from sea level, at Vera Cruz, to a height of 9,000 feet, a few miles east of Esperanza.

This section, between Esperanza and Orizaba, is one of the great scenic delights of Mexico. Few mountain roads can surpass it, for at Esperanza the traveler is on the bleak tableland of the interior and at Orizaba he is among the orange groves and coffee plantations.

Viewed from the dizzy heights of Boca del Monte, the valley below suggests a delicate piece of patchwork, with soft browns and greens and grays blended to form a harmonious whole. The road itself that wriggles along the rugged mountainside, is one of man's greatest achievements. Spidery trestles span bottomless gorges; a foaming torrent rushing along its depth makes the beholder dizzy. He readily understands why this great gap is called the Barranca del Infiernillo (the Ravine of the Little Hell), and appreciates the better the smiling contrast of the glorious valley of La Joya (the Gem).

It can readily be predicted that when this scenic road is modernized, it will prove a favorite route for visitors from distant lands.

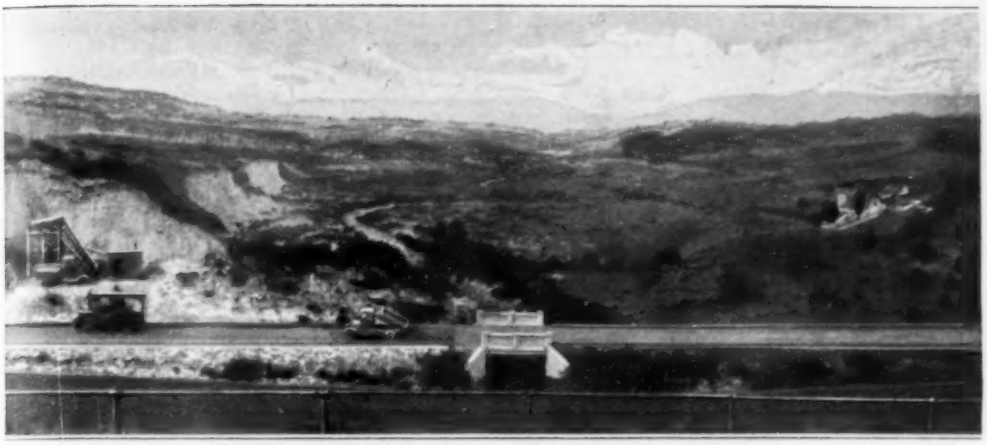
## LIMESTONE BEARINGS OUTWEAR WHITE-METAL BEARINGS

Street-car bearings of limestone are reported to have had a life of 35,000 to 45,000 miles in a service where those made of white metal lasted 6,000 to 7,000 miles. White metal is poured into a mold around the limestone and the latter bored out with a diamond tool. The porous stone absorbs oil, and in use quickly takes on a polished surface.

## COMBINE MODEL AND PICTURE IN HIGHWAY EXHIBIT

Combining a model of road-building work and an oil painting so skillfully that an observer is unable to detect where the two join, is the result achieved recently by a model maker and an artist who were employed by the U. S. Bureau of Roads, to prepare an exhibit for the Brazilian Centennial Exposition now being held at Rio de Janeiro. The model, which is 25 feet in length and 8 feet in depth, displays a gravel-type road, suitable for Brazilian conditions, with a concrete bridge in the foreground and a gravel pit in the background. Behind this, the painting, which

**Station at Alta Luz on the Mexican Railway, Which Climbs the Mountains with Grades as High as Five per Cent: Under the Proposed Scheme, 150-Ton Electric Locomotives, Interchangeable for Freight and Passenger Service, will be Run over This Section**

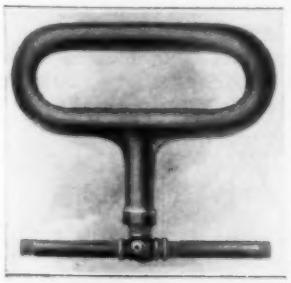


Combination Painting and Model, Skillfully Blended, Which Serves as the Exhibit of the Bureau of Public Roads at the Brazilian Centennial Exposition: It Is 25 Feet Long and 10 Feet High, and the Model Is 8 Feet in Depth

is 10 feet in height and as long as the model, presents an appropriate farmland and hill view. Semblance of reality is produced by the operation of tiny gravel-digging and screening machines, and a road roller, these being driven by a concealed motor. Another realistic feature is a stream, painted in the far background, but as it winds its way forward, a real stream of water is introduced at one of the turns and flows down under the bridge in the foreground, the whole presenting, in addition to a practical working model, an artistic scene of beauty.

## COOKSTOVE WITH ONE BURNER SUITABLY ADJUSTABLE

A cookstove that will burn gas, gasoline, or kerosene, and has all the burners in one oval-shaped pipe that can be swung under any part of the cooking top of the stove, is being manufactured in England. Underneath the top of the stove is a flat iron box of nearly the same size. The swinging burner is in close contact with the bottom of the box. The stove has four, six, or eight potholes with disks, which, if removed, are immediately replaced by cooking utensils to preserve the heat in the box. The stove can be connected with a copper boiler, and will thus furnish hot-water service.



## METAL ELECTRIC INCUBATOR ALSO USED AS HOVER

A round electric incubator which hatches the eggs and may then be used as a hover for the tiny chicks, is now available. From 60 to 100 eggs are placed in a metal pan, a hinged cover containing a heating element is closed over them, and the current switched on. The temperature of the interior is kept constant by the usual thermostat arrangement, the only care necessary being an occasional turning of the eggs by hand. After the eggs are hatched, the cover is removed, and a set of legs, together with a double brooder curtain, is attached to it, the whole providing an effective shelter.

This Electric Incubator Is Round So That the Heat is Uniformly Distributed to the Eggs That are being Hatched

## PRESERVE OLD HEADSTONES WITH COAT OF CEMENT

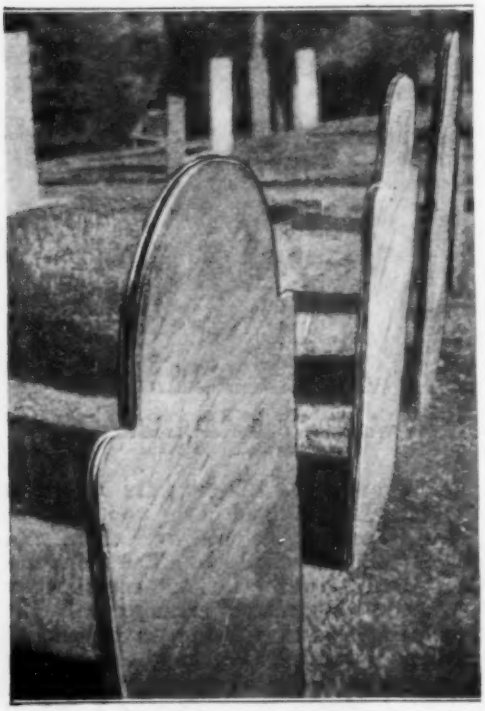
A process that will probably result in the reclamation and preservation of old headstones in many cemeteries throughout the United States has been found by a Vermont man. Not satisfied with a copper cap he had previously devised, he conceived the idea of incasing the markers in a thin layer of cement, thus protecting the sides and back of the stone, and leaving only the chiseled wording on the front exposed.

The Stones, after being Coated with Cement on the Sides and Back, the Front being Left Untouched So That the Faint Inscriptions may Still be Read

The old headstones, marking the resting places of some of the country's early pioneers, were first removed from the cemetery and carefully and thoroughly cleaned, special attention being given to cracks in the stones where the constant exposure to the weather had split them.

A wooden form was then made, somewhat larger than the dimensions of the stone to be treated. On the inside was placed a lining of zinc, so that the stone, when finished, would have a smooth surface. The ends, of course, were made to conform to the tops of the stones, which in some cases were semicircular and in others leaf-shaped.

At this stage the stone itself was laced on the sides and back with ¼-inch iron mesh to form a reinforcement for the rolled edges and back. Next, cement and a fine grade of sand were mixed and poured into the form to a height of 2 inches. Upon this mixture the stone was placed, face up, then "puddled" into the cement until it squeezed up between the sides and top of the stone and the form.



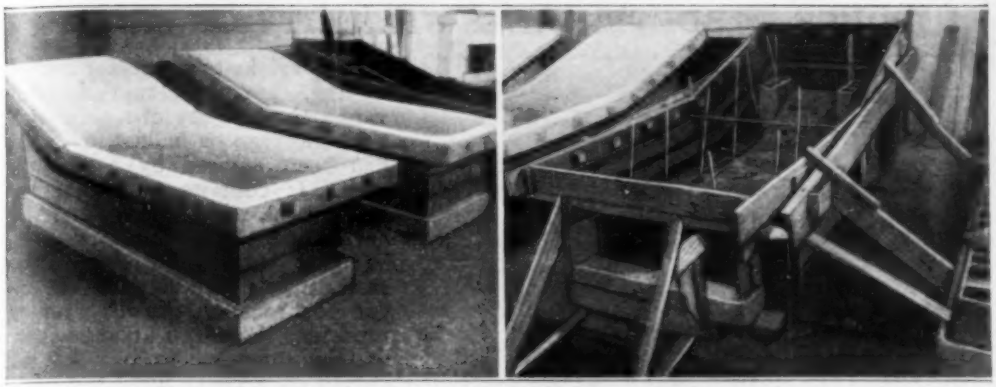
Side View, Showing the Condition of the Headstones before being Treated: This Type of Marker is Seldom Used at Present

## GOLF BALL OF NEW DESIGN HAS GREAT RESILIENCY

Maximum resiliency when driving and sufficient "rigidity" when putting, are merits said to be combined in a new make of pneumatic golf ball. The ball has a hollow center with a cross, or "wagon-spokes" arrangement, of rubber through it. Thus, while having enough elasticity to permit a long drive, the ball is hard enough to provide the proper resistance for accuracy on the putting green.

## BUILD ELABORATE EQUIPMENT FOR MUD-BATH CURE

Elaborate equipment for the taking of mud-bath cures, has recently been installed in one of the finest hotel-sanitariums in this country. Tubs of imitation Italian marble, fashioned after the ancient couch baths of the Romans, are located in rows in the large main bath-room. In each tub, 8 inches of mud, brought from an adjacent sterilizing and preparation room, is placed and the steam turned on underneath. When the tub

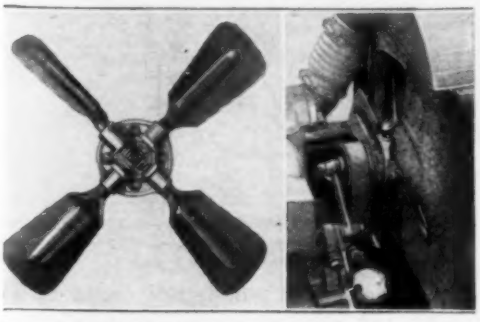


Left: Two of the Elaborate Mud-Bath Tubs are Seen in the Foreground, While a Partly Completed Tub is Shown in the Background. Right: Close-Up, Showing the Method of Constructing the Tubs with Hollow Tile and Reinforced Concrete in a Special Form

temperature reaches 95 to 100°, according to the physician's orders, the bath is ready. While the patient is reclining in the mud, a special ventilating system is constantly forcing fresh and warmed air up through vents in the flooring to the base of the tubs. It then passes up and around the hollow-tile sides, escaping through holes near the top, thus providing the patient with plenty of fresh air.

## REVERSIBLE AUTO FAN SAVES FROZEN RADIATORS

An automobile fan is now being introduced with adjustable blades that reverse the flow of air through the radiator so that in cold weather the radiator will be kept from freezing by warm air from the engine. It is made with a hub that fits the standard fan pulleys, into which the rounded end of the fan blades fit. A small pin through this rounded portion fits into one or the other of two recesses in the hub, according to the direction of air flow desired, and two small springs prevent the pins from slipping out.



Left: Automobile Fan with Adjustable Blades for Reversing Flow of Air through Radiator. Right: Fan Installed in Car

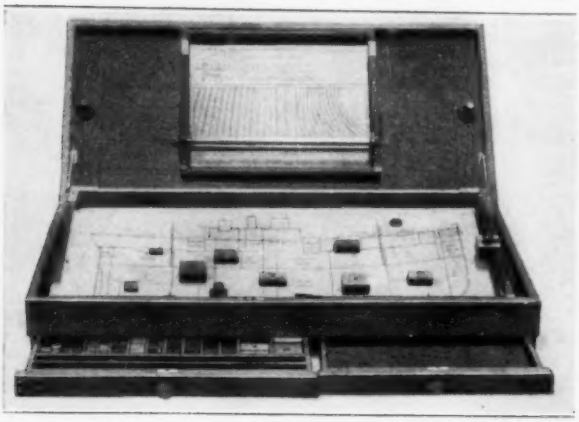
## SIMPLE WIRE-TYING MACHINE BINDS PACKAGES RAPIDLY

A wire-tying machine that tightens the wire around any kind of shipping case or container, twists the wire, and cuts it off neatly, is now on the market. When strapping a package, the end of

Wire-Tying Machine for Binding Packages: The Upright Handle Tightens the Wire, and the Crank Handle Ties It and Cuts It Off

the wire is put in the slotted end of a holding post, through a latch for retaining the machine in place, and also through a second binding post. The wire is then passed around the package in any desired way, and after being brought back through the holding posts, it is slipped into a notch in a ratchet wheel with which, by means of an upright handle, all the slack in the wire is taken up. By turning a crank handle three times, the wire is tied and cut off.

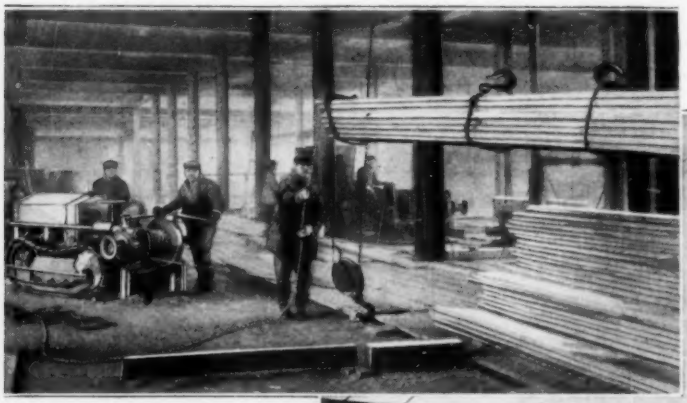
## DEVICE PREDETERMINES STABILITY OF SHIPS



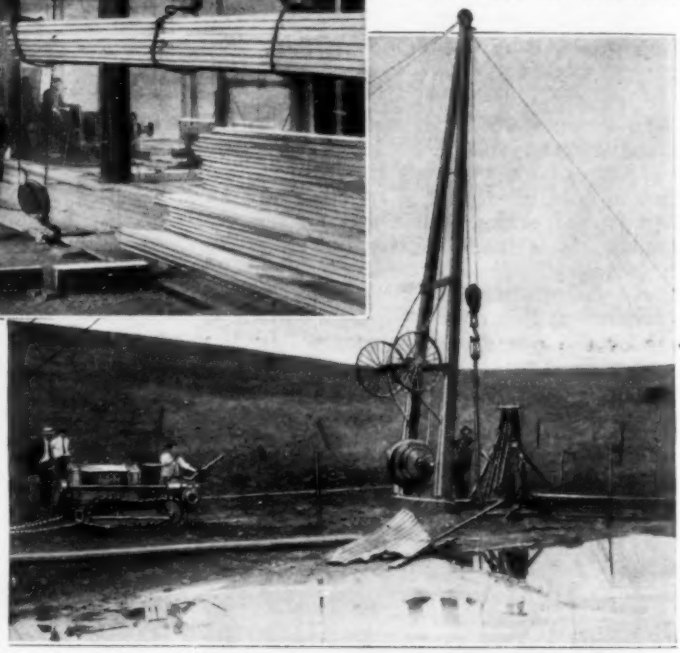
Arrangement of Charts and Weights by Means of Which the Stability of a Ship can be Readily Found for a Given Cargo or Ballast Loading, or a Combination of Both, and the Vessel Trimmed to Suit

A novel instrument for ascertaining, correctly and in advance, the stability of a ship with a given cargo or ballast, or both, has been devised by a Scotchman. It consists of a diagram of a vessel, with scales along the vertical and horizontal sides. Weights connected with the scales may be adjusted to different positions on the diagram to represent the cargo arrangement, and by reference to two sets of curves on a chart furnished with the instrument, the stability and trim of the ship are quickly predetermined. Another advantage is that it enables the shipmaster to predict the effect of fuel consumption.

## NEW TYPE OF WINCH MOUNTED ON A TRACTOR



Tractor-Type Winch, Hoisting 50,000 Feet of Lumber a Day on Large Construction Job



The Same Winch at Work Pulling an Oil-Well Casing, Which was Anchored at the Bottom by Several Feet of Closely Packed Sand, Long Undisturbed

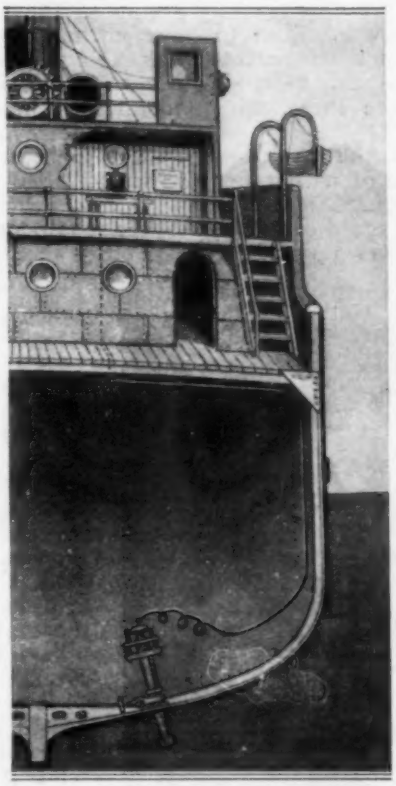
Ruggedly built, and simple in construction, is a new type of traveling winch for the use of road contractors and others. The winch is mounted on a compact tank-type tractor, having therefore a small turning radius, and occupying very little space. The winch and its niggerhead are driven by the tractor motor through worm gearing, with a minimum rope speed of 105 feet, and a maximum of 960 feet per minute, and with a minimum pull in pounds of 745, and a maximum of 6,900. The standard drum has a diameter of 6 inches, with a flange diameter of 18 inches, the same as the distance between flanges. Its capacity is from 1,230 feet of ½-inch to 3,030 feet of 5/16-inch rope.

# NEW ELECTRIC LOG FIXTURE OF SHIP'S HULL

By CARL PALMBLAD

A NEW ship's log which is electrically operated has recently been given its first trials in England, where it was developed by a former officer of the Russian navy.

There is no line connected with the instrument, for the log proper is not thrown overboard, but is fixed to the hull of the ship at a depth where there can be neither wave nor propeller disturbance. It may be briefly described as follows: The part outside the hull contains a terminal contact for insulated wires running to the electrical supply and to the indicating apparatus; a spring, also insulated, engages this contact and also the commutator, 20 revolutions of which represent a mile; the motion of the shaft of the rotator, which is in the form of a four-bladed propeller, is transmitted, through a double worm and wheel, to the commutator. As no packing is used around the rotator shaft, the resistance to its rotation is constant at all speeds and practically negligible. The indicating dial is graduated to record distances from .05 to 10,000 miles. There is also a panel with a table of speeds, a voltmeter, and three switches, for connecting the voltmeter to the battery for test; to throw the dial mechanism into the circuit, and to connect a buzzer, which signals every twentieth of a mile, so that the ship's speed can be obtained with the aid of a stop watch.



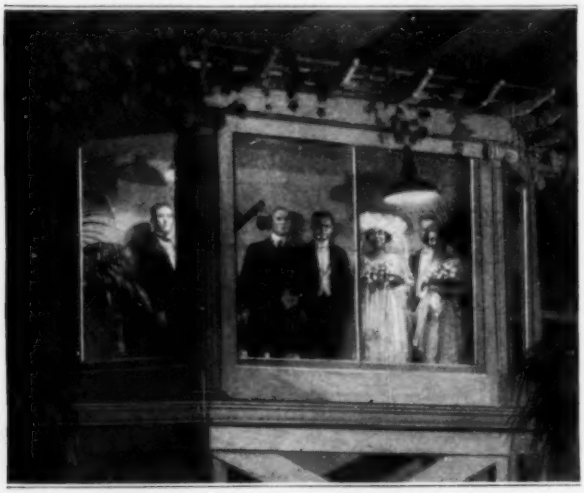
The Electric Log, Greatly Exaggerated in Size, as Installed in a Ship

The new log was first tested over a carefully measured half-mile course on the Serpentine, Hyde Park, London, when it was fitted

Parts of the Log and Recording Apparatus: Left, Outboard Part Disassembled, with Rotator and Contact Spring to the Right of It; Center, Recording Dial with Switch Panel and Speed Table Below; Right, the Log Proper Complete

to a rowboat, which was pulled over the course at a constant speed of about 3 miles an hour. Later it was taken to Portsmouth and tested on a submarine. Several runs over a nautical mile, at varying speeds, were made there, with highly accurate results.

"With this log," says the inventor, "correctness to a fraction of a foot per mile has been easily obtained, and this correctness stands for any speed of a ship. The majority of navigators up to the present have been inclined to charge all errors of the log to the account of the current, and therefore we have had rather misleading information regarding the currents. Navigators have been trying to do their best and have checked their log by the revolutions of the ship's propellers—but the first rough weather has upset all their calculations, and at the very time when there was the greatest need for reliable information, the log was obviously showing false."



The Wedding Party as It Appeared to Those Who had Gathered in the Exposition Hall: The Booth Was Soundproof and Connected with a Broadcasting Station

## THOUSANDS SEE AND HEAR RADIO WEDDING

What is believed to be the first performance of its kind occurred in Pittsburgh recently when a wedding ceremony was performed in a large glass booth, visible to thousands attending an electrical exposition, while radio apparatus broadcast the words spoken to those at the show and countless others listening in. The booth, specially constructed for the occasion, was soundproof and connected by telephone to a station at East Pittsburgh, where the sending apparatus was located. Loud-speaker receivers in the exposition hall carried the words to those who had gathered there.

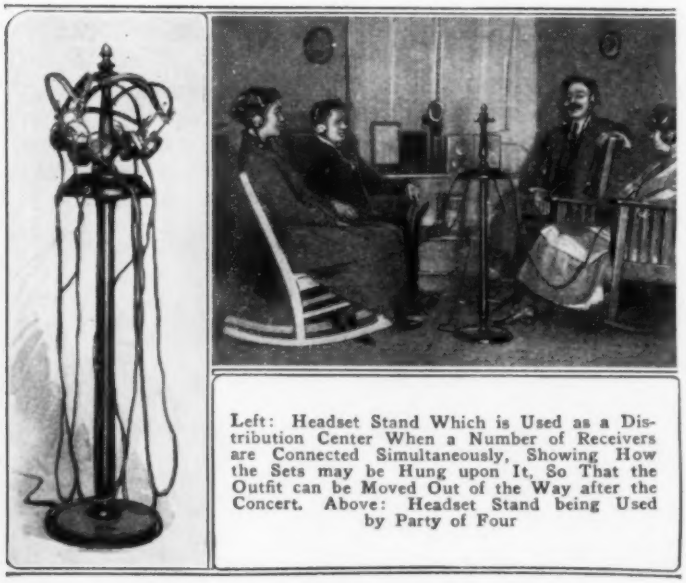
## BOW-AND-ARROW GOLF IS LATEST DIVERSION

Playing golf with bows and arrows, instead of the usual clubs and balls, is the latest diversion in the sporting world. Golfers of no mean ability have been defeated by as many as 20 strokes in contests with archers who shoot arrows from the tees to the cups. With the bow and arrow, "drives" of 250 and 300 yards are said to be a common occurrence, while the accuracy of approach to the greens would make any golfer envious. One thing is certain, any archer making the rounds of a course is never troubled by the "ball" overrunning the putting green. Neither do wet greens and fairways, nor the scientifically placed bunkers and traps, prove a hindrance to his game, or to the serenity of his temper.

Putting Green of a Golf Course, Showing the Players "Holing Out," One with the Regulation Ball, and the Other with an Arrow

# EXPLORING THE DACHSTEIN ICE CAVERNS

Views Taken by an Exploring Expedition Recently Conducted into the Famous Dachstein Ice Caverns, Located in the Austrian Alps: The Illustration at the Top of the Page Shows Three of the Explorers in One of the Beautiful Caverns, Each Bearing a Special Type of Torch, by the Aid of Which These Unusual Photographs were Taken. In the Center Picture is Shown the Means Used to Scale the Almost Perpendicular Sides of the Ice Walls. At the Bottom of the Page is Seen One of the Large Glacial Formations Traversed by the Travelers



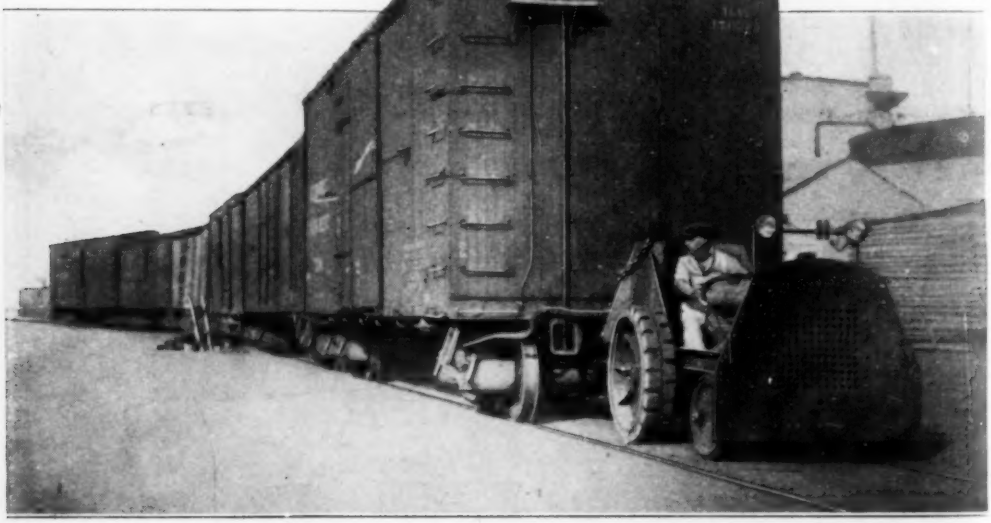
Left: Headset Stand Which is Used as a Distribution Center When a Number of Receivers are Connected Simultaneously, Showing How the Sets may be Hung upon It, So That the Outfit can be Moved Out of the Way after the Concert. Above: Headset Stand being Used by Party of Four

## HEADSET STAND FOR RADIO

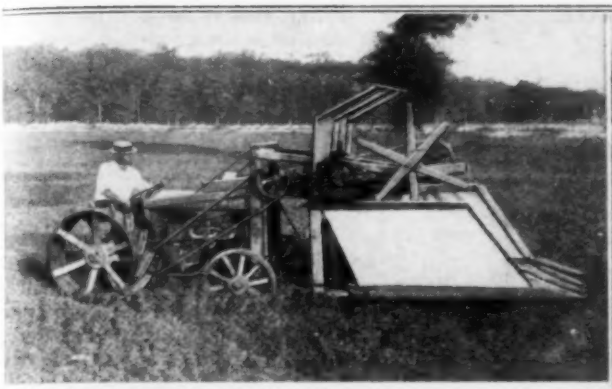
An ornamental wooden headset stand, for use as a distribution center when a number of receivers are used simultaneously, and as a rack for holding the headphones when these are idle, has been introduced. This appliance eliminates any crowding near the equipment. The stand may be moved around a room at will, and when the concert is finished, it may be conveniently placed in a corner or closet, out of the way. The outfit has a switch to disconnect any receivers not in use.

## TRACTOR FITTED TO PUSH OR HAUL FREIGHT CARS

Equipped with a standard coupling device at the rear and a heavy perforated steel plate at the front, a tractor has been made which can both push and haul freight cars with equal ease. Switching with various kinds of tractors has been a steadily growing custom in industrial yards, but this is the first time these practical features have been adopted. Numerous advantages are claimed for a tractor so equipped, greater convenience, and cheaper cost of upkeep being the two most emphasized. As many as seven loaded cars have been pulled at one time, although the engine is of a type not unusual on tractors, and no attempt was made to give it greater power or improve it in any way.



The Tractor, Fitted to Push or Haul Freight Cars, is Shown Here Backing into a String of Cars Which It Is to Move. The Automatic Coupling Device Makes It Possible for the Tractor to Complete This Operation with a Speed Equal to That of a Locomotive



Above: Side View of Power-Driven Thresher That Removes the Seed from Clover as It Travels across the Field. Note How the Thresher Mechanism Overhangs the Front of the Tractor. Right: Front View of Thresher, Showing the Beaters and the Troughs into Which the Clover Seed Falls. Practically All the Seed is Said to be Recovered

## POWER-DRIVEN HARVESTER FOR THRESHING CLOVER

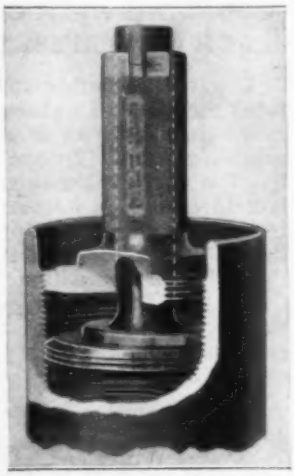
A new power-driven harvester for cutting and threshing sweet clover is said to be capable of securing all the seed in the clover, none of it being lost as in the ordinary method of cutting sweet clover with a binder. The machine is mounted on two rear tractor and two front steering wheels between which is the power plant. Behind this is the driver's seat, and in front of the machine are the harvesting and threshing devices.

## BUCKET FOR AUTO RADIATORS HANDY AND COLLAPSIBLE

Water is conveniently carried and poured with a new collapsible auto-radiator bucket. The bucket, fitted with a number of circular rings to support it when full, has at the bottom a converging neck which is equipped with a special valve. When the crossbar of the valve is rested on the radiator, the weight of the bucket automatically opens the valve and the water pours freely. Collapsed, for storing away, the bucket is only 2½ inches high.

## DOUBLE-PLUG PIPE GAUGES FOR INTERNAL THREADS

For measuring the taper of inside pipe threads, a new gauge is made with an inner plug which is first screwed into the thread by hand, and over its handle an outer plug is then screwed in, both being set hand-tight. On the handle of the inner plug there is a line which, if the taper is correct, will register with the zero line of graduations on the handle of the outer plug, these graduations being spaced in divisions showing variations of .002 inch in the pitch diameter in a length of 2 inches, which is the distance covered by the gauge.



¶Since January 1, this year, weather summaries and forecasts, together with storm, hurricane, frost, and cold-wave warnings, and advisory messages, have been broadcast from the naval radio station, known as "NAT," which is located at New Orleans, La.

## DEFIES ALL ACIDS, CLAIM FOR NEW TYPE OF INK

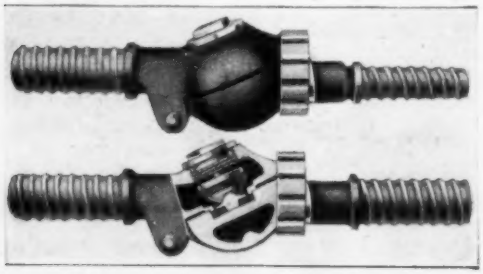
An ink recently invented is said to defy all efforts of the professional forger to

Result of Test in Which Ordinary Ink was Removed from a Check, While a Name Written with a New Ink was Not Affected

remove it without destroying the paper itself. In an interesting test held to demonstrate this claim, a check blank was partly covered with ordinary ink, and a name written over this section with the new ink. Acids were then used to eradicate the name, but while white could be made to show in the blotch of ordinary ink, the letters written with the new ink were not affected.

## COUPLING WITH CHECK VALVE FOR COMPRESSED-AIR HOSE

A patented automatic air-hose valve takes the place of a globe valve, and at the same time acts as a coupling in compressed-air lines. In one half of the coupling is a check valve so constructed that it is held closed on its seat by the pressure from the air line. Two projections beyond the valve seat, with a cross pin between them, form a protection for the seat when this half of the coupling is dragged across the ground at the end of the hose. The cross pin also forms a pivot for hooking on the other half of the coupling, when



Top: Automatic Hose Coupling Which Takes the Place of a Globe Valve in an Air Line. Bottom: Sectional View of the Coupling

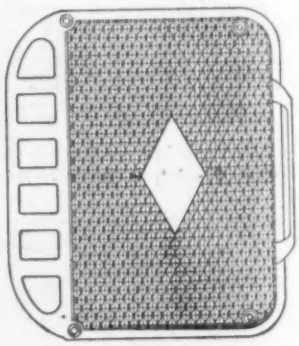
the two halves are coupled and locked together by means of an eccentric clamping ring. When this is done, a projection on the hose-shank half of the coupling pushes the valve open and admits the air pressure.

## "PICK UP" RADIO MESSAGES 100 FEET UNDERGROUND

"Picking up" radio messages with a receiving set installed 100 feet underground in a mine, from a broadcast station 18 miles away, is the latest wireless achievement. The set was located not far from the point where the light and power wires entered the mine, and when removed to some distance from these, the signals were found to diminish in force and clearness. Although the tests did not actually lead to any practical method of using wireless waves for underground communication, they did prove clearly that electromagnetic waves, contrary to the former theory, may be made to travel through solid strata. The fact that radio signals were detected below the surface of the earth, will doubtless be sufficient evidence of possible transmission through the ground, to encourage further experiments.

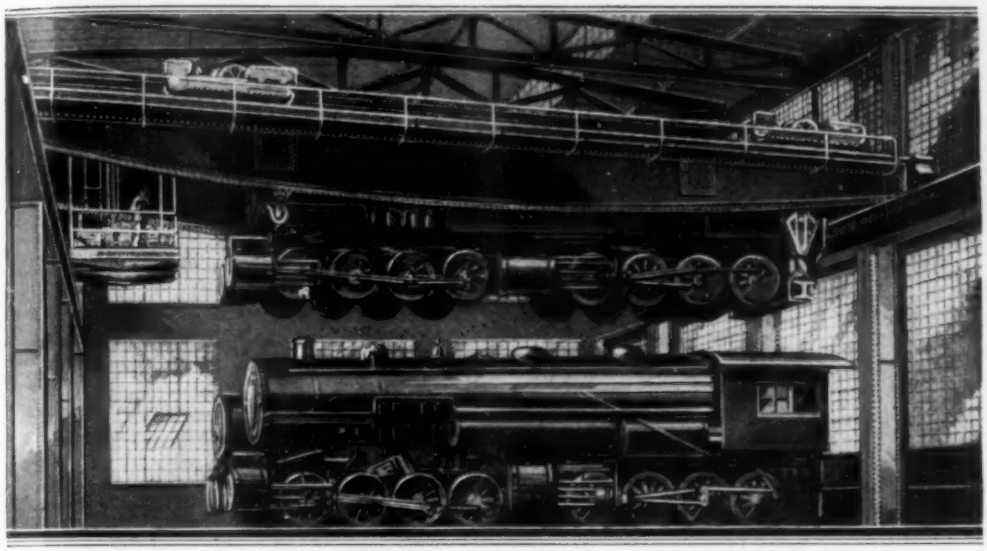
## AUTO-STEP PLATE HAS SPACE FOR OWNER'S NAME PLATE

Using a triangular open space left in the center of a new auto-step plate, the owner may now buy and insert his own name plate. Two other features of the step plate are a raised rear guard, to protect the side shields, extending lengthwise above the running board, and a small shoe scraper built into the plate at its outer edge.



Proper packing of bolts, nuts, washers, and rivets for shipment to Chile is an important matter, because freight is transshipped to barges in the open roadsteads, and it is urged that shippers send these materials to that market in heavy double sacking or iron containers rather than wooden kegs.

## LOCOMOTIVE CRANE SAVES HEADROOM IN SHOP



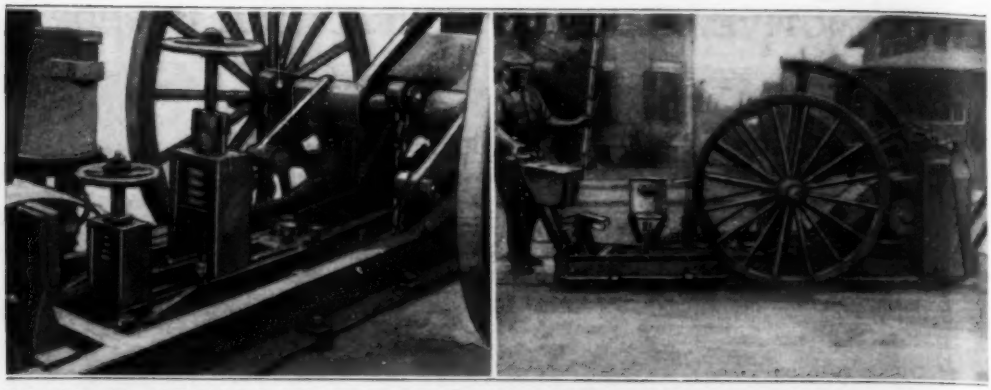
Large Gap Crane Which Allows the Locomotive to be Hoisted Well Up between the Crane Girders, Thereby Saving Considerable Headroom in Repair and Erection Shops: This Idea can be Made to Effect Considerable Economies in the Design of New Plants

The gap crane adapted to locomotive repair or erecting shops saves 15 to 18 feet of headroom, which in the case of new shops will effect a considerable saving in the building cost. In this design, the girders that form the bridge are spaced, and the trolleys that carry the hoists are arranged, so as to allow the locomotive to be hoisted well up between the girders. Each of the two trolleys is equipped with two hoists instead of one, as in the usual crane, and the crane can be fitted with lighter auxiliary hoists for general shop service. In a shop equipped with this type of crane, the messenger cranes are placed above, where the lift-over operation does not interfere with the crane running the full length of the shop.

## OVERHEAD IRRIGATION PIPE OSCILLATES SPRAY

An oscillating arrangement for overhead irrigation pipes has been designed by the Department of Agriculture of Massachusetts. The mechanism, run automatically by the pressure of the incoming water, reverses the pipe from right to left and back again so that the plants on each side receive the benefit of the spray. Formerly it has been the practice to turn the pipe over by hand, or spray the water on one side only. About a minute is required for the complete movement of the pipe.

The Oscillating Device Shown at the Right Turns the Pipe from Left to Right So That the Stream Reaches Both Sides of the Garden. It can Also be Made to Spray One Side Continuously



Left: Close-Up of Rail-Grinding Machine, Showing the Two Handwheels, by Means of Which the Pressure on the Stones is Regulated. Right: Side View of the Grinder at Work; Note the Large Wheels Used in Moving the Machine

## HEAVY SHELF BOXES HANDLED BY BLOCK AND TACKLE

Shelf boxes in hardware stores, or similar places, where the merchandise is

Heavy-Metal Shelf Box being Handled by Means of Block-and-Tackle Outfit, to Facilitate Lifting

heavy, may be handled in an efficient manner with a block-and-tackle arrangement. The boxes, usually of metal, are first perforated in three places so that the hooks of a saddle appliance may be inserted. This saddle is raised or lowered by a rope and pulley. Thus the bulky boxes are easily taken down or replaced on the higher shelves.

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¶The "Leviathan," now being reconditioned at Newport News, will be placed in transatlantic service on June 1, this year, according to a tentative arrangement made by the Shipping Board.

## RAIL-GRINDING MACHINE USES FLAT STONES

A grinding machine for resurfacing worn rails, recently put in use by the Boston street railway, differs from the common type in that the grinding wheel is replaced by four flat stones, mounted in a reciprocating holder that is driven by a connecting rod and crankshaft geared to an electric motor. Two handwheels regulate the pressure between the rail and the stones, which are supplied with water from a tank at the side of the machine. When in operation, the machine rests on two small wheels, from which the load is transferred, by means of a crank-operated gear and sector, to two large wheels when it is desired to move it. Although slower than the older method, a true surface is produced, insuring a more permanent repair of the track, and consequently economy.

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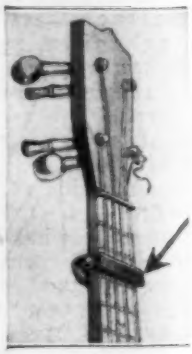
## UKULELE FINGERBOARD SLIDE TRANSPOSES TO ANY KEY



Placed on the fingerboard of a ukulele and held by spring pressure against the strings, a metal slide is so constructed that it can be shifted, thus transposing to any desired key. A transposing chart is furnished with the slide, which can be put on or taken off in a second. It is said to improve the tone and make fingering easy. It can be used on all stringed instruments of the banjo type.

# UGLY NORDHOFF BECOMES BEAUTIFUL OJAI

By C. MORAN

THE transformation of a shack-and-shanty town into a place of architectural delight, virtually overnight, is the accomplishment of the citizens of Ojai, Calif. Cement turned the trick.

The town—formerly called Nordhoff—was a typical frontier settlement. Ramshackle buildings lined the main street. Treacherous mudholes filled the road. Then, as if touched by a magic wand, the town was changed into a thing of beauty. The shacks and shanties are still there, but they wear a disguise. A long, Spanish arcade hides their ugliness. A stately Spanish tower rises above and incloses the post office. Across the road a low wall with arches surrounds a natural park, tennis courts, and clubhouse. Smooth boulevards, towering shade trees, riding paths, country places, hotels, and homes with wide verandas and beautiful vistas, have been built.

A Store Building on Main Street in the "Shack-and-Shanty" Town of Nordhoff, California, before Its Transformation: Similar Buildings Lined the Whole Street

One of the town's leading citizens had a vision. He purchased 10 acres of land on the side of the street opposite the stores, laid out the park, and built the pergola along the street. The storekeepers were quick to see the contrast between their old worn-out buildings, and began a campaign of improvement. A uniform arcaded concrete front connecting all the stores was built. At a cost of a few hundred dollars, each storekeeper soon found himself the owner of a building not only of considerably greater value but also of more attractive appearance. The post office was faced with cement and the tower built over it. A new hotel along the same architectural lines was erected, and visitors found some inducement to remain in the town instead of passing quickly through.

The whole undertaking furnishes encouraging proof that the craving for beauty pervades even smaller communities, whose former isolation, perhaps, was the only reason why this spirit has not

View of Main Street in the Renamed Town Ojai: The Improved Appearance of the Street Is Striking, Despite the Fact That the Buildings Themselves were Not Materially Altered but Only Concealed from View by an Arcade of Cement Construction, as Seen to the Left. The Tower on the Church, However, Is an Addition to the Old Structure

This Picture Offers a Closer View of the Arcade behind Which are Hidden the Old Business Buildings, of Which That to the Extreme Left Is the Post Office. The Smooth Condition of the New Cement Street Is Also Apparent. The Pergola and Vaulted Entrances on the Other Side Lead to the New Park

before expressed itself in visible improvement.

The entire work cost $50,000. Nordhoff was an eyesore; Ojai is a popular resort. Other communities use it as a pattern.

Here Is Another Street View, Which Even Better Illustrates the Monotonous Character of the Old-Fashioned Shops and Their More or Less Dilapidated State. The Building in the Left Foreground Houses the Post Office

## COMPRESS POWDERED GYPSUM TO MAKE BUTTONS

Buttons are now being made of powdered gypsum, which is first compressed to the desired shapes in molds and then dampened with a fine spray of water to effect a "setting," or hardening, process. It is said that buttons are manufactured economically, rapidly, and with exceeding exactness in this manner, in addition to which they possess great durability. Buttons may also be made by this method from burnt magnesite, or from a mixture of burnt magnesite and gypsum. If burnt magnesite is used, the hardening must be done with a chloride-of-magnesium solution, the result being an especially strong and durable material.

## A NEW MILITARY SELF-LOADING RIFLE

By CAPTAIN EDWARD C. CROSSMAN

SEVERAL years ago a board of navy officers made the surprising discovery that a perfectly strong and well-designed navy rifle for one of the battleships would unlock its massive breech and open itself when fired with the light charges used for saluting, but when used with the high-pressure full-service charges, would remain as firmly locked as the vault of a great city bank during the hours of darkness.

The resulting line of investigation terminated in the application for a patent by Commander Blish on a form of breech-locking device for big and little guns which would remain firmly locked during the high and dangerous pressure of the explosion in the gun chamber, but would

then unlock itself and permit the breech to open when the pressure had fallen to a safe point, and the projectile had left the barrel.

A great American arms factory has produced two arms using this queer principle, one of them the now well-known submachine gun, the other a self-loading infantry rifle submitted to several testing boards of the American army. The little submachine gun, using pistol cartridges, has been adopted by many American police forces, and was the "machine gun" forming the cargo of the steamer billed to Ireland and seized a year or two ago in New York harbor.

The Thompson self-loading infantry rifle is less well known, as it has been made only in experimental form for test by the ordnance boards of our army. This rifle, designed by the former assistant chief of ordnance, and using the Blish patents, fires the 1906 U. S. Army cartridge, fed from a box magazine, which is in turn loaded by the regulation army clip, with which we are all familiar.

As submitted to the army board, the rifle was made with the retractor, or recoil spring, in a tubular housing in the rear of the breech mechanism proper. The bolt is locked by a modification of the Blish principle, in this case turning out of engagement with the receiver shoulders when chamber pressure and friction have fallen to a low enough point to free the engaging surfaces. The little brother of the infantry rifle, the submachine gun, makes use of a wedge-shaped locking bolt, sliding at nearly right angles to the bolt of the rifle and lying below it.

Retraction of the bolt, to load the first shot from the magazine, is accomplished by a bolt handle at the rear of the receiver, but after this first cartridge is loaded into the chamber, the rifle requires no further aid than a pull of the trigger for each shot until the 10-shot magazine is empty.

Unlike the submachine gun, there is no device to change the fire to truly automatic—that is, fire continuing as long as the trigger is held back and the magazine contains ammunition. The heavy recoil of the infantry service cartridge and the relatively light weight of the rifle would make the arm unmanageable with automatic fire. Even the 17-pound Browning rifle for this ammunition requires very short bursts of automatic fire to keep its bullets in the vicinity of the object fired at.

As the Blish principle is based upon friction and as friction is a variable, depending upon the presence of grit or grease, both the submachine gun and the Thompson self-loading infantry rifle require oil for their successful working. The inventors argue that, as motor cars and their engines operating at lower speeds and with less heat than is developed by smokeless powder, require oil, there is no sound reason why the automatic or semiautomatic war gun should not also be oiled.

Whether oil can be successfully used on a rifle intended for issue to the ordinary infantry private remains a question, in view of the dirt and neglect that mark the use of the infantry rifle in actual fighting.

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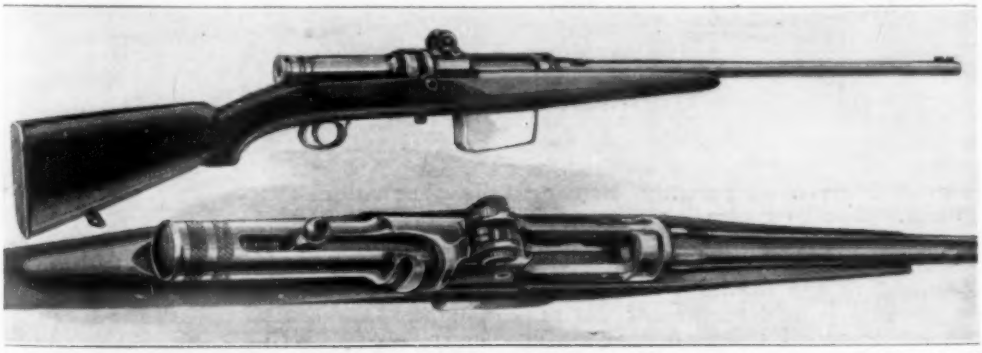
¶An accurate spirit level with the bubble constant at all ordinary temperatures, in which the proportion of air and liquid and the shape of the bubble tube are so arranged that a variation in temperature affects only the cross-sectional area and not the length of the bubble, has just appeared.



Top: Self-Loading Rifle Which has been Introduced for Use by the Infantry, Showing the Tubular Recoil-Spring Chamber and the Boxlike Magazine for the Cartridge Clips. Bottom: Looking Down upon the Rifle Mechanism at Close Range, Showing the Peculiar Bolt Action and the Recoil Spring

## STREET-RAILWAY SIGNS ASK CLEAR TRACK FOR CARS

Failing in an attempt to make it unlawful for motorists to operate their machines on street-car tracks in the business district, a Los Angeles car company is directing an appeal to the drivers themselves. Each week a new series of posters, placed at the front and rear ends of the cars, urge the motorists to keep off the tracks, or at least to keep moving if on them. One reading, "Mr. Autoist: Give the Street Car Riders Fair Play—Please don't Block Traffic—Thanks!" and another, "Mr. Autoist: Street Car Riders Are in a Hurry, Too,—Be Fair—Thanks!" may be taken as typical of the series.

Signs Placed on Los Angeles Street Cars, as Shown Above, have Proved an Effective Means of Enlisting the Coöperation of Motorists in Keeping the Tracks Clear

## PAINT MADE WITHOUT OIL CHEAP AND DURABLE

Paints and varnishes of various kinds in which oil or shellac will not be required as a mixing body, or medium, may now be made by a recently discovered process. The new paints and varnishes can be produced at approximately half the cost of those now on the market, according to the inventor. In addition, the product is said to present the same appearance as oil paint, to have no noticeable odor, and not to blister in the hottest sun, nor crack at low temperatures.

## PENDULUM APPARATUS IS USED IN AERODYNAMIC TESTS

A pendulum apparatus for making aerodynamic experiments such as testing airplane models, has been developed with a view to the needs of those who do not have access to a wind tunnel, since it can be easily and cheaply constructed from materials available in any engineering workshop. The model is carried in a tubular frame at the lower end of a hollow pendulum, 12 feet long, which is suspended from a pivot on the ceiling. With the pendulum in motion the lift force of the model is measured by the deflection of the pendulum and indicated by a pencil mark on a piece of paper on the floor. The drag can be calculated from reduction in height of the pendulum swing. The apparatus can also be used for plotting the pressures on the surfaces of the model.

## EARTH-BORING AUGER HAS RELIEF VALVE

An auger that has recently been introduced abroad for the purpose of boring holes for fence posts and poles, has an ingenious valve arrangement in the wing that allows earth to pass through while boring, and keeps it from going back into the hole when the auger is pulled out. A toothed guard pushes stones out of the way of the valve. A size that can be handled by one man without unduly tasking his strength, will make holes ranging from 2 to 15 inches in diameter and about 7 feet deep.

# CAMPING TENT WITHOUT STAKES, GUYS, OR POSTS

A new lightweight camping tent for automobile tourists, which requires neither posts, stakes, nor ropes, is supported by steel braces running from sockets at the corners of two beds, stretched along the side walls, to a framework of steel bows under the tent roof. The beds, of light pine and nonstretching webbing, weigh 32 pounds, and when folded occupy only a small space. The braces are carried in two brass tubes which are partly telescoped and used as the ridgepole when the tent is to be erected.

One of the advantages claimed for this ingenious method of support is that it relieves the canvas of strain, and consequently prolongs its life. With the smaller size one-bed tents, it is possible to make the overhead framework horizontal, thereby converting the tent into a canopy.

Another innovation is a cooking unit or "kitchenette," a canvas-covered aluminum chest that serves both as a cupboard and a stove stand. The sides are so made that they can be extended to furnish a windshield for the stove, while the whole outfit can be hung on the rear wall of the tent, set up on the ground anywhere, or

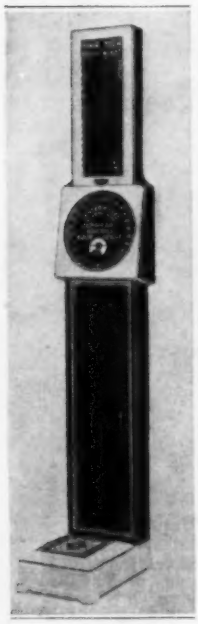
The Folding Auto Bed Which Forms an Integral Part of the Camping Outfit: The Webbing is So Arranged That It Remains Taut after Long Use

Here is Shown the Entire Framework of a Two-Bed Tent, Weighing Only a Few Ounces and Nesting in Telescoping Tubes. On the Ground Is One of the Beds Folded

Above: View of the "Kitchenette," Aluminum-Lined and Weighing But 37 Pounds. Below: The Tent as It Appears When Set Up. Note the Absence of Tent Poles, Stakes, and Guy Ropes

placed on the auto running board. Still another practical piece of camp equipment included is a webb-topped table, which can be adjusted and used as a chair.

## HEIGHT AND WEIGHT TOLD BY NEW SLOT MACHINE



In a novel improvement of the ordinary weight machine, the scale is placed in the middle of the upright section, which in this case is glass-covered. Above the scale is painted a series of horizontal lines, at the left of which appear small black squares. When the coin is inserted, the weight shows as usual, and the squares drop, each revealing a height corresponding to its horizontal line. The center of the eyes being on a level with the top of the ears, height is indicated by the horizontal line upon which vision alights.

## WARNING LIGHTS FOR AUTOS LIKE RAILROAD SYSTEM

Protective lights for the rear of automobiles, patterned after the railroad system of red and green signals, are a recent development. When the machine is moving, a green light shows constantly, but when the brakes are applied, the green signal is extinguished and a red one flashes a warning to following motorists. Two sets of green and red lights are used, one set for daylight driving and the other for night travel, the former being more powerful so that they may be plainly seen in the sunlight. Interlocking shutters are provided for each pair of lights and the signal has two 1-inch red side lights.

**Automobile Signal Device Which Uses Red and Green Lights: The Day Lights Are Brighter than Those Used at Night**

## AUTOMATIC MEASURING AID FOR USE OF CHEMISTS

Measuring small quantities of fluids, such as is required of chemists or those engaged in similar pursuits, has been facilitated by the introduction of an automatic appliance. The outfit, which may be clamped onto the neck of a bottle, or other container, or attached to a stand or bench, consists of a compressed-air cylinder actuated by a rubber bulb, the cylinder in turn operating a syringe. To the bottom of the syringe a rubber tube may be affixed, this tube extending into the bottle or other vessel from which the liquid is to be taken. A regulating, adjustable nut on the cylinder may be manipulated so as to control the amount of fluid drawn up when the bulb is pressed, this measured amount being then ejected from the tip, or nozzle, of the syringe when the bulb pressure is released. The apparatus will be particularly useful in places where a large number of routine tests are performed.

¶A long-distance telephone installation between Peshawar, India, and Kabul, the capital of Afghanistan, is under consideration at the instance of the ameer of the latter country. The line will pass through the famous Khyber Pass.

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**PARACHUTE BEATS AIRPLANE TO EARTH**

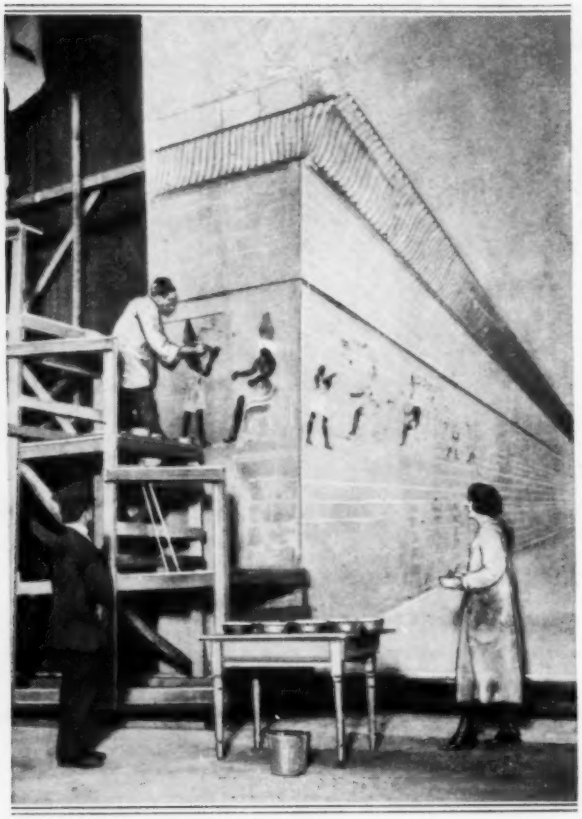
THIS picture shows Dick Cruikshank, famous parachute jumper, lighting on the ground, as he won, by a few seconds, a race to the earth with E. Hamilton Lee in an airplane. The race started 1,500 feet in the air, when Cruikshank dropped from the wing of the airplane, which dived abruptly in an attempt to make a record landing. By delaying the opening of the parachute, a jumper can shorten the time of his descent.

**SCIENTIFIC METHODS IN THE UTILIZATION OF WOOD**

SCIENTIFIC methods in the utilization of wood are believed to be as profitable and as practical in the forest as in the later stages of manufacture, this fact being illustrated in the accompanying picture. Some of these methods are: the cutting of "low stumps" so as to secure maximum log lengths; the peeling of felled logs to facilitate seasoning and to minimize insect or fungus attack, and leaving the small growth of sufficient desirable seed trees to insure reproduction. The slash, or trimmed-off branches, is burned as soon as it is cut from the trees, together with all underbrush. This clearing of the ground aids in "skidding out" the logs, and also leaves it in a condition that will not favor fires which might sweep the cut-over land and retard a second growth of timber.

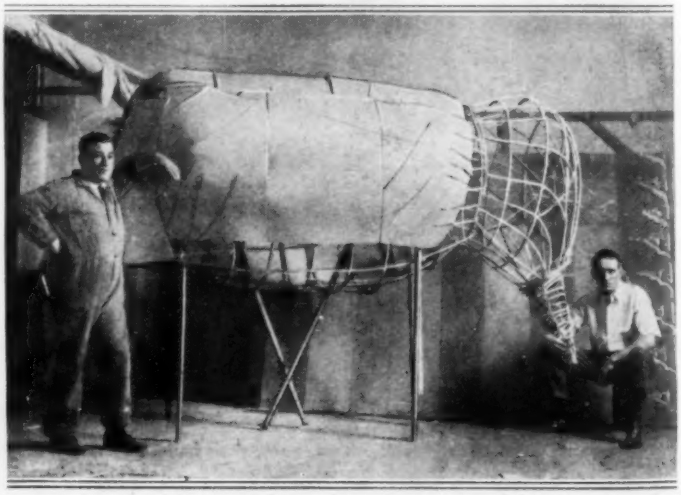
# SCENIC ARTISTS MAKE CLEVER STAGE EFFECTS

The realistic scenes and spectacular theatrical effects shown on the stage and on the screen are not often what they seem to be, and it is interesting to know a little of the way they are created by clever scenic artists and craftsmen.



Clever Young Scenic Artist and His Wife Busily Engaged in Painting One of Their Striking Settings for a Comic-Opera Production

The work of two young artists who design and paint the scenery for a western comic-opera company, is attracting considerable attention for the type of their scenery, which is based on the psychology of the relation of colors to moods and actions; to suggest rather than reveal. In a comic opera, of Oriental setting, for instance, in one scene they used designs and colors found in Turkish rugs, and the effect on the imagination seemed all that could be desired. In making artificial trees, of which one was to be hollow and house a man-sized owl, the trunk was made of laths, rattan hoops, wire-bound into form, and loosely covered with canvas, which was soaked with glue and squeezed into ridges, corresponding to bark and knurls. Florists' moss, stuck into the wet glue, gave a final touch of realism. A trick elephant was made up of a canvas-covered skeleton formed of flexible ribs and strands of rattan, over which cardboard was laid, and the whole properly painted. It was arranged that the men, who were to support the form on their shoulders and furnish the legs of the animal, should operate the ears, eyes, and tail by means of strings, and manipulate the flexible trunk with the aid of a rod, so as to pick up articles, like a bottle. Various trappings of Oriental design were put on to give a final touch of realism to the animal.

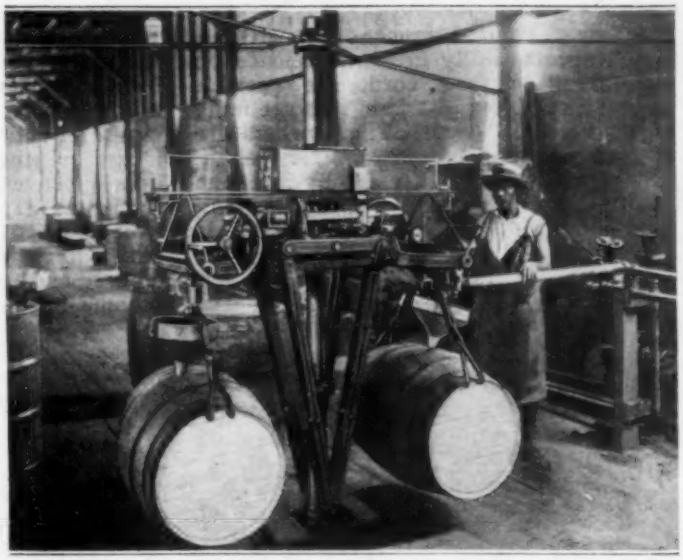


A Stage Elephant in the Process of Construction: The Skeleton, Formed of Flexible Ribs and Strands of Rattan, is Covered with Canvas. A Man, Front and Rear, will Furnish the Legs

¶A race track to be used in trying out new types of cars is to be built by motor-car builders and the Automobile Club of France in a wooded district north of Paris. It is planned to acquire 900 acres and make the track from four to six miles long.

## REVOLVING BARREL SCALE IS AUTOMATIC

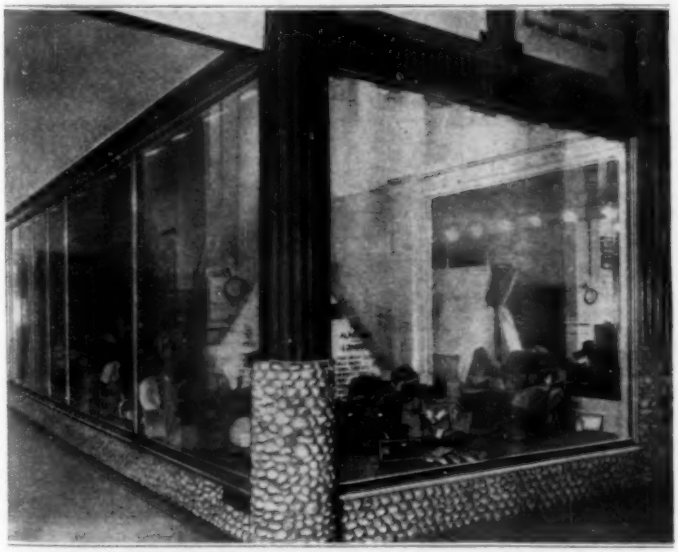
There has lately been invented a revolving scale for the automatic filling of barrels with an accurately weighed quantity of oil or other liquid. Two distinct weighing elements are mounted on a frame that surrounds a vertical shaft, with the intention that one barrel will be filling while another is being removed. Each scale has a tare beam and poise and a separate blade and poise for the liquid, which is automatically shut off when the desired amount has run into the container. The filled barrel is quickly revolved to the unloading position while an empty barrel is swung under the filling spigot.



Revolving Scale for Filling Barrels with Oil and Other Liquids: When the Desired Amount has Run In, the Flow is Automatically Shut Off, and the Scale is Then Turned Halfway Around

## STORE FRONT IS BUILT WITH STONES AND SPLIT LOGS

A store front of cobblestones and split logs has been built by a Pacific-coast retailer of outdoor equipment in an attempt to create a suitable atmosphere for the display of his goods. Carrying out the rustic theme, in the interior of the store, desks, shelving, and other fixtures have been made of split logs, and model camps set up as in actual use.



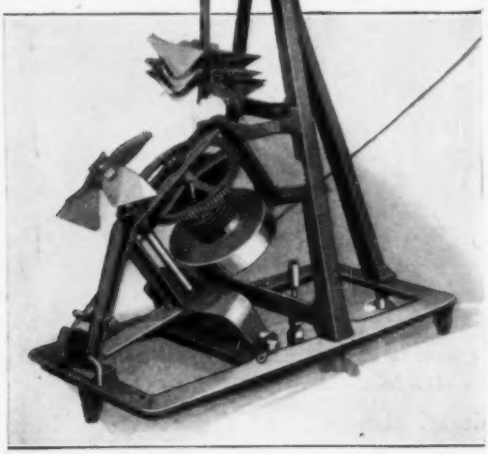
The Rustic Effect of This Store Front is Also Carried Out in the Interior of the Store, the Goods being Displayed as if in Actual Use

## MINIMUM SPEED OF 175 MILES SET FOR PULITZER RACE

It was decided that an airplane not capable of making better than 175 miles an hour would be ineligible to compete in the 1923 Pulitzer Cup races, at a recent meeting of the National Aeronautic Association. At the same time the maximum landing speed for this race was fixed at 75 miles an hour. On account of the dangers of making abrupt turns at such extraordinary speeds, and the inability of the heart to force blood to the brain against the centrifugal force that occurs, the committee has arranged for the race to be four laps around a 50-kilometer equilateral triangle with two towers at the angles so as to insure a wide turn.

## TRAPSHOOTING MACHINE HAS STAR-SHAPED MARKERS

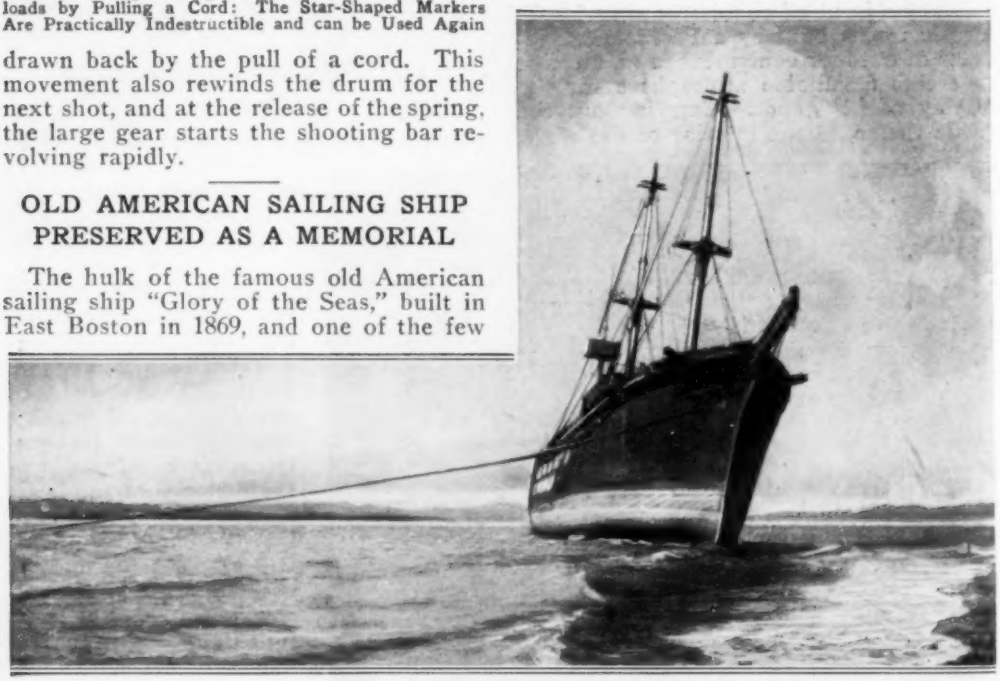
A newly invented trapshooting machine, which automatically fires and reloads on the pulling of a cord, has peculiar star-shaped markers that are flung high into the air. The markers are stored on a vertical shaft, from which they drop, one at a time, onto the shooting bar as the mechanism is drawn back by the pull of a cord. This movement also rewinds the drum for the next shot, and at the release of the spring, the large gear starts the shooting bar revolving rapidly.



Automatic Trapshooting Machine That Fires and Reloads by Pulling a Cord: The Star-Shaped Markers Are Practically Indestructible and can be Used Again

## OLD AMERICAN SAILING SHIP PRESERVED AS A MEMORIAL

The hulk of the famous old American sailing ship "Glory of the Seas," built in East Boston in 1869, and one of the few remaining examples of the clipper-ship age, was being towed to a beach on the shores of Puget Sound, there to be burnt for the salvage of the iron and copper in the hull, when its destruction was halted by a telegram from Boston. It was announced that east-coast shipping interests are endeavoring to make arrangements to tow the ship back to its old home port, where it will be rerigged and set up as a permanent memorial of the American sailing-ship days. Meanwhile, old "Glory of the Seas" will remain moored on the beach where it was to have become its own funeral pyre .

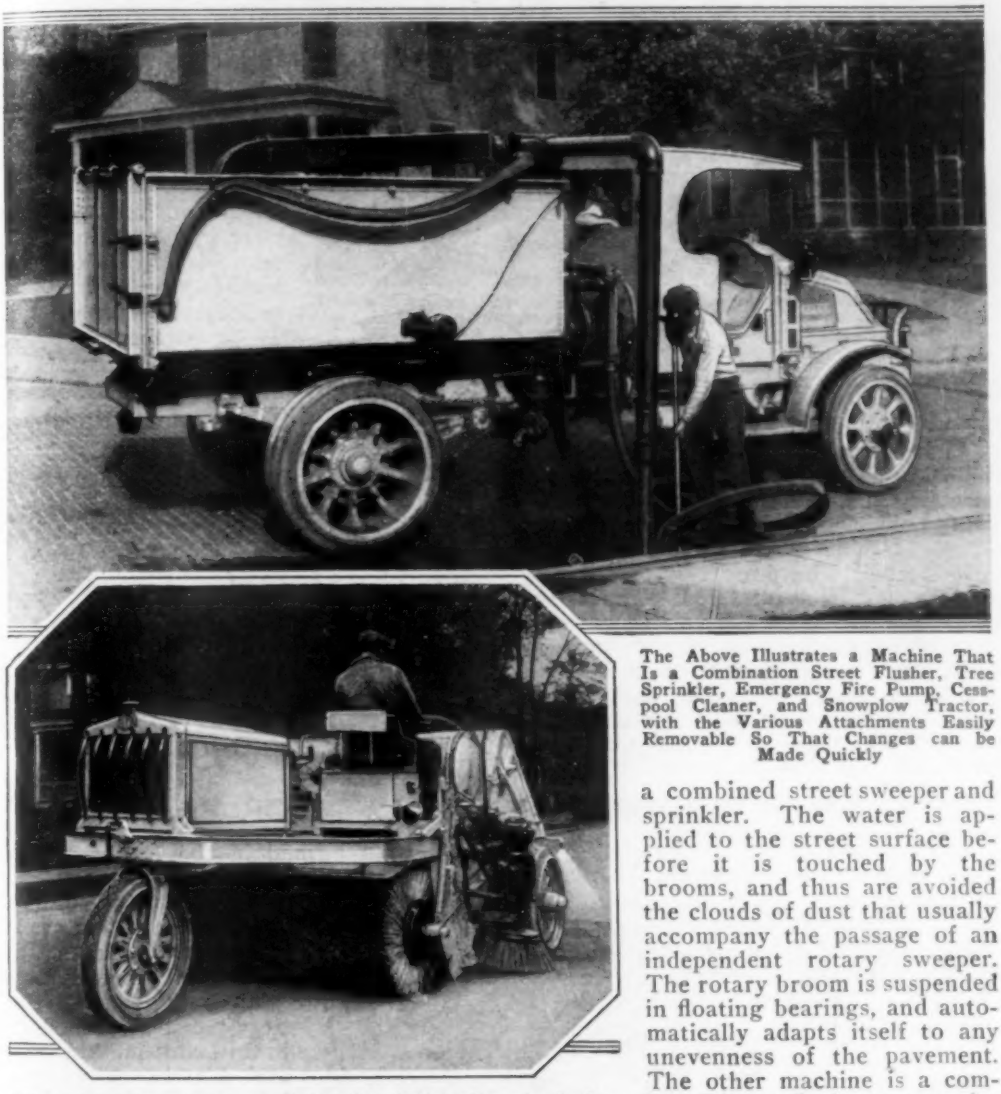


The "Glory of the Seas," an Old-Time Clipper Ship, as It Lies Beached on the Shores of Puget Sound, Awaiting Its Fate: Boston Interests are Endeavoring to have It Restored to Its Former Beauty, and Preserved at Its Home Port

## HEAT AND ELECTRIC WAVES OF SAME LENGTH FOUND

According to the ether-wave theory of energy radiation, heat, electricity, and light are essentially of the same nature, differing in their manifestations only by reason of their different wave lengths. Thus heat waves, so far as investigators have hitherto been able to ascertain, are much shorter than electric waves, and between the longest heat wave and the shortest electric wave there has been a break or gap in continuity, which scientists have been anxious to fill, because

the intermediate wave lengths might represent some unknown form of energy. Success has now come to the searchers in this field, and it is announced that two scientists of the Nela Research Laboratories, Cleveland, Ohio, have been able to generate, receive, and measure electric waves of only half a millimeter, or about 1/50 of an inch long, that is, of practically the same length as the longest heat wave.



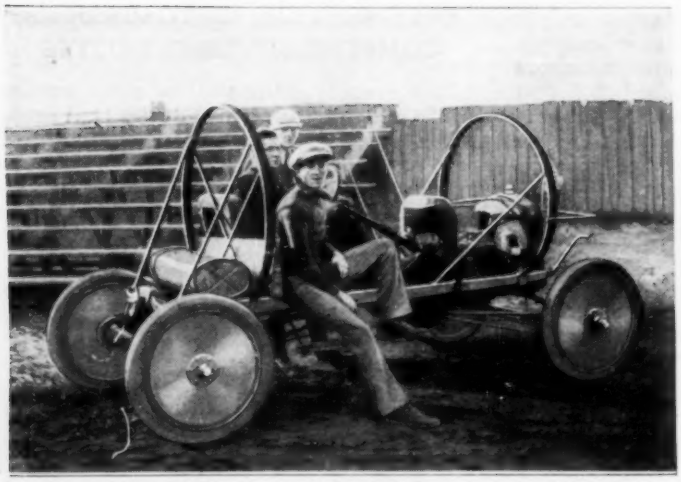
Combination Street Sweeper and Sprinkler Which Wets the Surface Ahead of the Revolving Brush and Prevents the Clouds of Dust That Usually Accompany Such Operations

¶When you want anything and do not know where to get it, write Bureau of Information, Popular Mechanics, Chicago.

## CITY-SERVICE AUTO TRUCKS COMBINE SEVERAL DUTIES

Two motor-driven municipal-service trucks which will perform duties that heretofore required independent units, have been developed and are now in use. One is a combined street sweeper and sprinkler. The water is applied to the street surface before it is touched by the brooms, and thus are avoided the clouds of dust that usually accompany the passage of an independent rotary sweeper. The rotary broom is suspended in floating bearings, and automatically adapts itself to any unevenness of the pavement. The other machine is a combined street flusher, tree sprinkler, emergency pump for fires, cesspool cleaner, snowplow tractor, and ordinary motor truck. Any of its various attachments can be removed at will. These machines will be particularly appreciated in the smaller municipalities where conditions do not warrant the purchase of equipment adapted to only one class of work.

The Above Illustrates a Machine That Is a Combination Street Flusher, Tree Sprinkler, Emergency Fire Pump, Cesspool Cleaner, and Snowplow Tractor, with the Various Attachments Easily Removable So That Changes can be Made Quickly



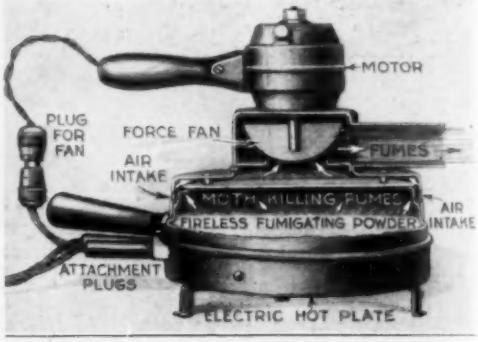
One of the Homemade Auto-Polo Cars Used in an Exciting Contest: Neither Cars nor Players Suffered Injuries in the Strenuous Game

## HOMEMADE CARS USED IN AUTO-POLO GAME

In staging an auto-polo contest not long ago, students at the University of Indiana used some light cars that they rigged up to withstand the hard knocks of that strenuous game. The chassis was stripped of all the nonessentials, and equipped with an iron bumper in front and one large iron hoop front and rear. In spite of hard crashes, no damage or accidents occurred.

## FIRELESS FUMIGATOR KILLS FLOUR MOTHS

Fumes emanating from a noncombustible powder, are circulated by means of an electric fan in a new method of exterminating flour moths that are such a nuisance in mills where flour is processed and stored. The powder is placed on a fireless and well-insulated electric hotplate that drives off the volatile constituents, leaving a residue to be thrown away. This method is said to assist in the eradication of other insects that have a tendency to infest flour mills, by stupefying them so that they can be easily collected.




Fireless Electric Fumigator Reported to Be Effective in Destroying Insects That Infest Flour Mills

## CARTRIDGE BELTS SALVAGED FOR BRASS

Huge quantities of cartridge belts, said to have cost the government $1.75 each, have been burned in the furnaces of a smelting and refining company, to salvage their brass content. The value of the brass in each is about 1½ cents. As is well known, these belts consist mainly of heavy canvas, the only brass being in the snaps and clasps. Thus, the ratio of the initial bulk to the ultimate concentration is striking. The metal obtained from a pile of belts that would cover the area of an ordinary city block, may be contained in a bin of but a few cubic yards' capacity.

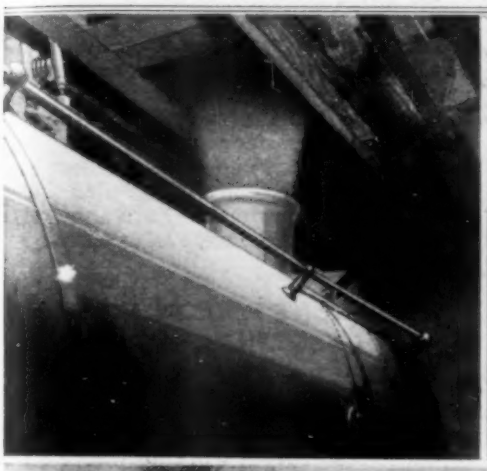
Impressive-Looking Pile of Army Cartridge Belts to be Salvaged for the Brass Buckles, Each Worth Only About 1¼ Cents

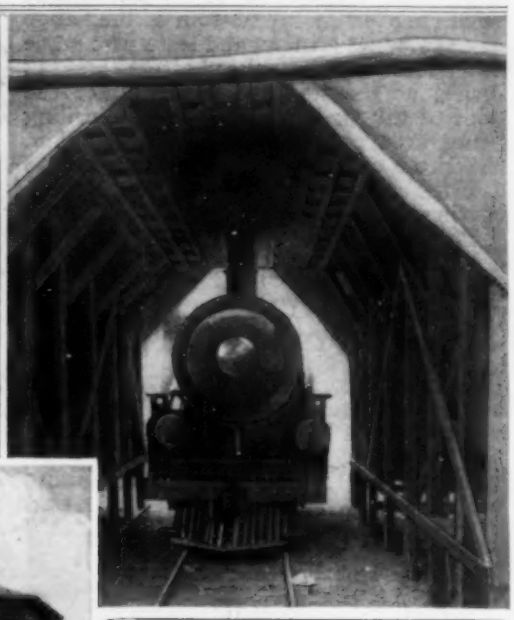
# SMOKE PREVENTION IN CHICAGO UNION STATION

By ROBERT H. MOULTON

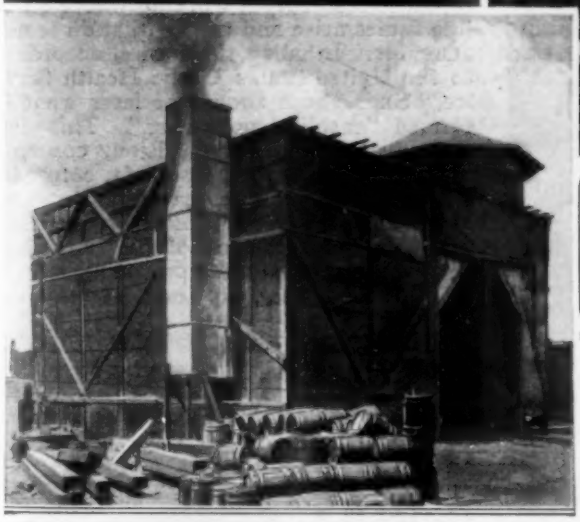
ONE of the most serious problems to be faced in the construction of modern railway terminals is that of abolishing the smoke nuisance created by locomotives while standing in the train sheds. Special devices on locomotives, mechanically operated ducts, and others operated by the blast from the locomotives, have all proved more or less unsatisfactory. Therefore, in constructing Chicago's new $60,000,000 Union Station, the engineers decided to experiment along new lines.

For this purpose they erected a special structure which was, in effect, a section of the viaducts that pass over the depressed tracks in the train shed and those which overhang the station tracks at a number of street crossings. Because of the peculiar construction of the station, it was known that, if smoke and gases were permitted to accumulate under these viaducts, they would quite likely sift into the concourse and produce an extremely undesirable condition in one of the most used and important spaces in the entire station, which would be difficult to remedy later.





Upper Left: Locomotive Stack Discharging Smoke through Experimental Slots in Roof of Test House. Above: Locomotive in Test House Built to Determine Best Way of Eliminating Smoke Nuisance in New Union Station at Chicago



Outside View of Structure in Which Smoke Tests were Conducted: It was Built to Create, as Nearly as Possible, Conditions That would Exist in the Train Shed

The test house, as it was known, represented a two-track section with just room enough for a single locomotive and with a curtain which could be dropped at each entrance in order to create conditions as they would be in the station itself, and so make the tests more thorough.

It was decided in the beginning that the only device which would be entirely satisfactory would be one that could perform its function entirely independent of the locomotive under all conditions of standing and running, and which could

also be installed in a manner that would not require any structural changes in the viaduct design.

Accordingly, a design was made of a system of open slots in the ceilings of the viaducts over the track center line. These slots were continuous in length, except where broken by the bottom of the flange of the viaduct girders, and were first made 30 inches wide at the bottom and 12 inches at the top, the space under the floor of the viaduct and above the ceiling being used as a gas or smoke chamber, and these chambers in turn connected to a series of flues and ducts leading to ventilating fans.

The device worked successfully from the start, the only trouble being that, when the locomotive was laboring very hard, the smoke and gas had such great velocity that they would slightly overcome the suction of the fan, with the result that a small quantity of smoke escaped down through the smoke duct over the next track.

This difficulty was overcome by the use of a suction-flue design with the openings in the form of a continuous slot at the top and a baffle arranged to stop the smoke and gases from passing this point and at the same time guiding them into a slot, the space below the flue being closed. The experiments have shown the engineers that the device is practical.

## CABINET OF 48,300 PIECES TAKES YEARS TO MAKE

A cabinet consisting of 48,300 pieces has just been completed by a patient workman who spent the greater part of 13 years in accomplishing his self-appointed task. The finished product is of pedestal design with many decorative borders and corners, and an ornamental clock. Pictures of noted men and an American flag, made of tiny bits of wood, are also incorporated in the cabinet.

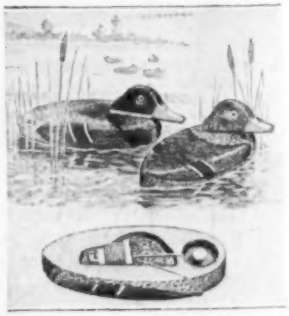
This Cabinet, with Its Intricately Patterned Pedestal, Pictures, Flag, Decorative Borders and Corners, and a Clock, is Built Up of 48,300 Pieces of Wood

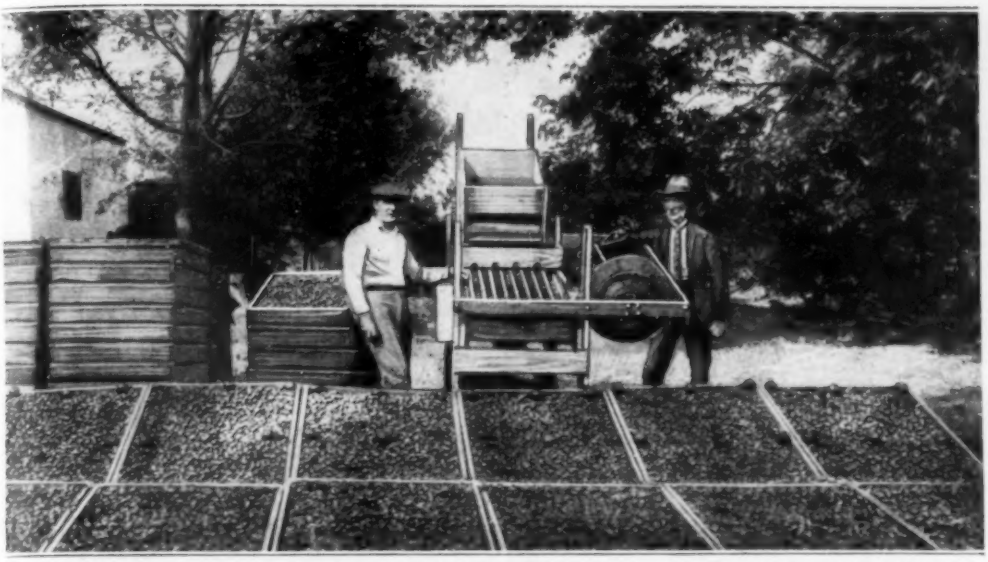
## PERMANENT POISONING FROM GASOLINE FUMES

Symptoms all the way from drowsiness to a state of talkativeness and foolishness, commonly called a "jag," have been found to result from working where gasoline fumes arise and the ventilation is not adequate. Inhaling the fumes, according to the United States Public Health Service, brings about sooner or later what is termed "gasoline poisoning." This disease results in blurred vision, constant dryness of the throat, insomnia, constipation, loss of appetite, extreme nervousness, and other conditions, depending upon the temperament of the individual and whether or not the poisoning is in a mild, acute, or chronic form.

## DECOY HAS SPACE FOR PARTS AND IS EASILY CARRIED

A wooden decoy with a detachable head, which, together with the anchor and anchor cord, can be carried in a cavity made in the underside of its body, is a recent innovation in duck-hunting equipment. The head, resting on a small pivot, can be swung about to various positions. It is said that the duck floats without the objectionable side roll usually noticeable with wooden decoys.





Using the Grading Machine Shown Above, Eight Sizes of Pecan Nuts can be Quickly Sorted. The Nuts Pass from the Hopper onto Rollers, with Various-Sized Openings between Them, Thence along Gutters Leading to Baskets on the Ground

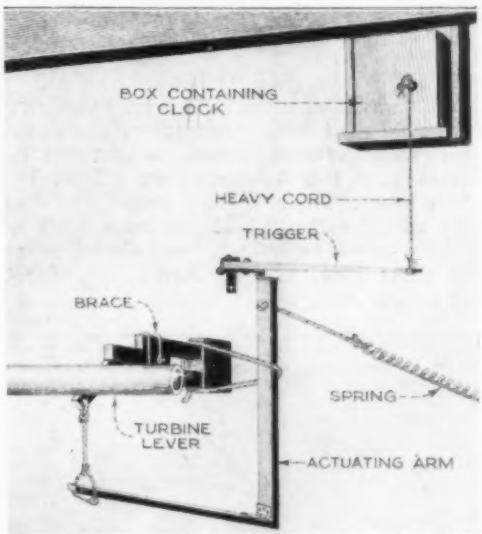
## SORT EIGHT SIZES OF PECANS WITH GRADING MACHINE

Eight sizes of pecan nuts, ranging from ½ inch to 1¼ inches, are quickly graded with a new machine. The nuts are dumped into a hopper at the top, and then fall by gravity into seven channels in front, the bottom of these being made of steel rollers with graded openings. As these rollers slowly revolve, the nuts work down until they pass through their respective openings, and thence along special gutters leading to baskets on the ground. A large hand-turned wheel with a belt transmission to the rollers is the only power used.

## ALARM CLOCK IS LIGHT TENDER IN MINNESOTA VILLAGE

In the village of Elba, Minn., an alarm clock is used to shut off the electric light and power at night by means of an arrangement that is simplicity itself.

The village light plant is a small hydro-electric one, driven by a turbine set in the tailrace of the village mill. Each day, before going home for his evening meal, the miller winds and sets the alarm of the clock to go off at 11:00 p. m. When the time arrives, the alarm goes off, and by means of a cord, a trigger is pulled. This moves a hinged lever sufficiently to permit a heavy spring to recoil and pull its support away from a brace, which, up to the appointed time, holds the turbine lever in open position. When this brace falls, the lever automatically assumes the



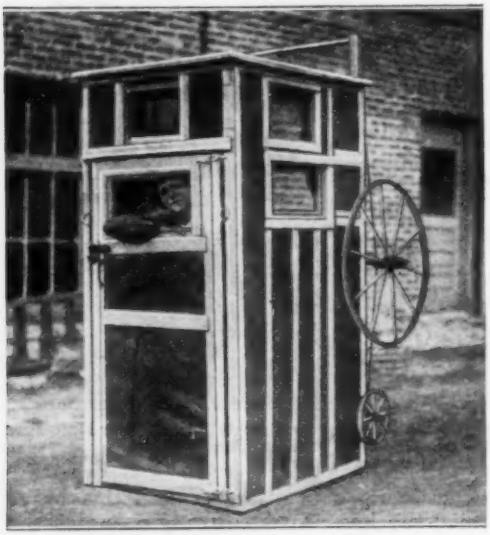

Crude but Thoroughly Practical Apparatus Which was Devised by a Miller to Extinguish the Lights in a Minnesota Village Automatically

closed position, thus shutting off the power and extinguishing the lights.

¶A practical standard of night illumination for automobile license tags is being sought by the U. S. Bureau of Standards. The tests will determine the nature of light needed to make the tags visible at a reasonable distance.

## FLAGMAN BUILDS PORTABLE HOUSE FOR WINTER

To render himself "immune" against the rigors of winter, a street-railway flagman of Kansas City, Mo., has built a small portable house which he can bring to work with him. Attractively painted and with several small windows, the house cost the flagman just $21.10, besides labor. Four wheels, two large and two small, arranged at the rear wall in a baby-carriage effect, and handles at the same side, enable him to transport the house easily.



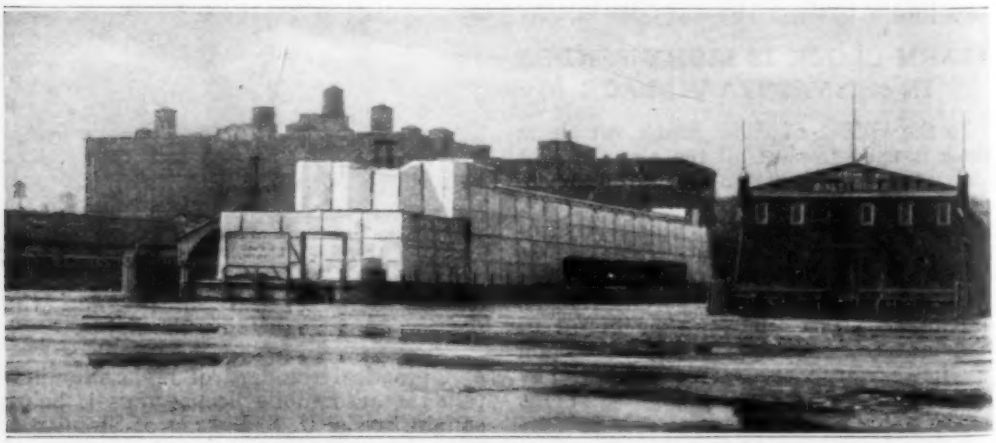
Wheels Arranged on the Back of This House, Made as a Winter Shelter by a Flagman, Enable Him to Bring It along to Work Each Day

## NEW WATER-SUPPLY SYSTEM PROPOSED FOR MANILA

The water-supply system of Manila, P. I., considered inadequate for many years, must soon be enlarged or replanned entirely, according to the manager of the metropolitan water district. At a meeting of the Manila Chamber of Commerce three projects were proposed, the first to improve the present leaky reservoir, the second to construct two new large dams and a new pipe line, and the third to build a dam in connection with the Angat River, from which the water would be brought to the city by a tunnel. The capacity of this latter project, which seems to be the most favored of the three, would be 80,000,000 gallons and would take care of the city's needs for many years to come. Although subject to continual repairing, the present reservoir still has a leakage of 9,000,000 gallons a day.

## HUGE CANVASES SHELTER MEN BUILDING PIER

With huge canvas covers protecting them from wind, snow, and sleet, and a steam-heating plant keeping the temperature up, the men engaged in building a pier on the Delaware River, at Philadelphia, find that they can work no matter what the weather conditions are. A heavy support and framework prevent the roof from collapsing with heavy loads of snow, while the side covers, though put up more simply, have been found sufficient to withstand both wind and sleet. An 80-horsepower boiler feeds the heating system.



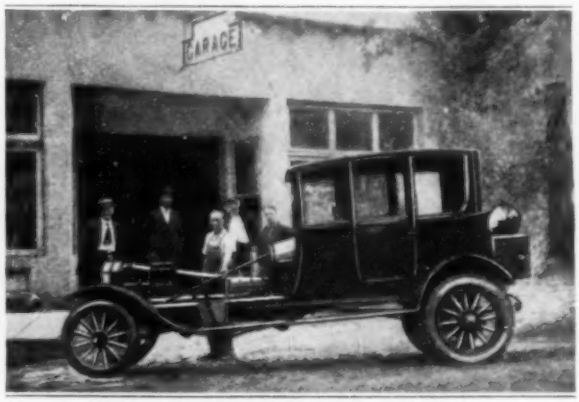
With the Huge Protecting Canvases Shown Above, Erected over the Steel Structure, and a Heating System Inside, the Men Building This Pier on the Delaware River Found They could Continue Working No Matter How Cold or Stormy It Was Outside

MOUNTAINSIDE MINE WORKINGS SHOWN BY AERIAL PHOTO

THE large scale on which surface mining of copper is conducted, is vividly shown by a photograph taken from an airplane which flew over a large mining property at Bingham, Utah. The picture shows so clearly the series of terraces formed by the steam shovels cutting their way into the side of the mountain, that the engineers use it as a means of planning future operations. It is only by large-volume mine operation such as this, where thousands of tons of crude ore are taken out daily, and by the complementary milling equipment, that the present development of the extensive desposits of low-grade copper ores has been economically possible.

## LIGHTWEIGHT AUTO-SEDAN WITH TANDEM MOTORS

With the object of increasing its power and range of operation, a standard lightweight automobile has two of its regular motors installed in tandem upon an extension of the chassis of the car. Each motor has its independent carburetor and ignition system, and the standard radiator serves both of them. This construction about doubles the power of the car, and necessarily greatly increases the wheel base, which becomes as much as 138 inches. One car so constructed is said to have operated well in a number of road tests, and the builder predicts better results from this construction in the future.




Standard Lightweight Automobile with Two Motors Instead of One: The Motors Are in Tandem upon an Extension of the Chassis That Increases the Wheel Base by About 38 Inches

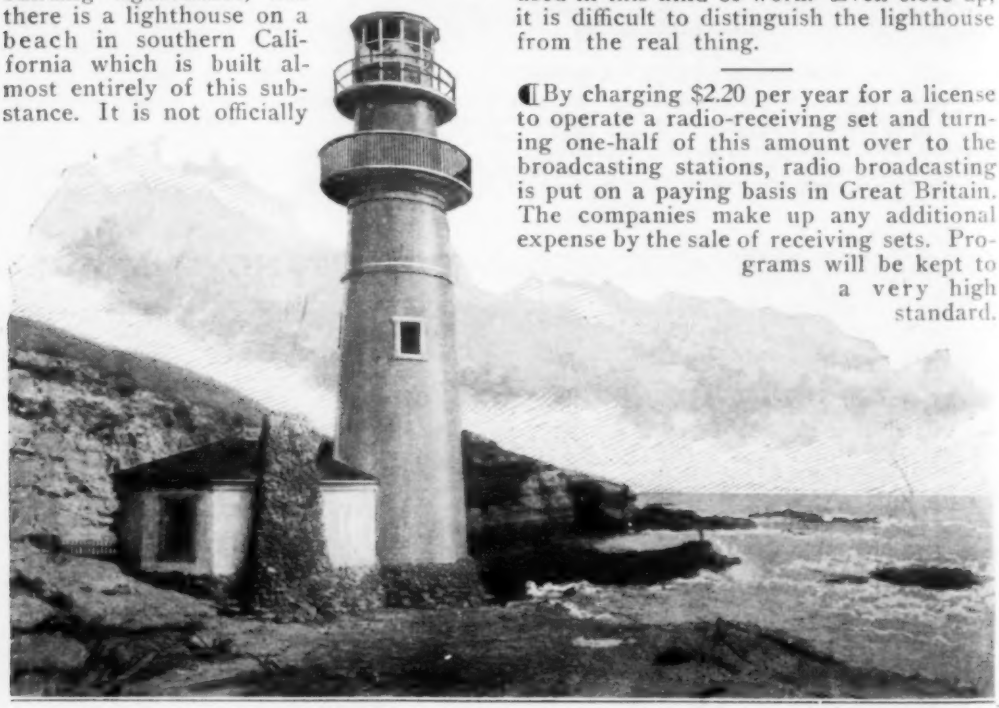
These Natives of the Philippine Islands, having Decided upon a Change of Residence, are Carrying Their House along with Them. The Practice is Said to Be Common in That Country

## FILIPINO MEN MOVE HOUSE ON SHOULDERS

The high cost of moving is unknown to natives of the Philippine Islands, where they not infrequently pick the structure up and carry it away on their shoulders. The roof being the heaviest single piece, it is usually carried by the stronger of the men, while other members of the family trot behind with the other parts of the house. Moving in this amusing fashion is not a particularly easy task, but most of the men are strong and do not mind it.

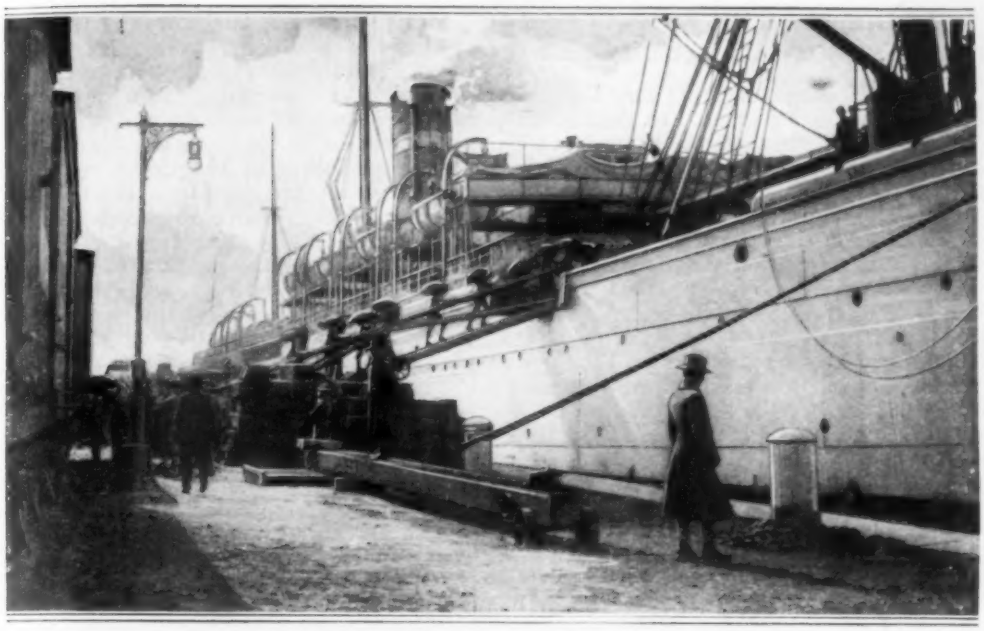
## PACIFIC-COAST LIGHTHOUSE MADE OF CARDBOARD

Cardboard has never been recommended by the government for use in building lighthouses, but there is a lighthouse on a beach in southern California which is built almost entirely of this substance. It is not officially listed, however, for it is the property of a motion-picture company and is only used in this kind of work. Even close up, it is difficult to distinguish the lighthouse from the real thing.



The Lighthouse Shown Here was Made Almost Entirely from Cardboard, Though Its Outward Appearance would Lead One to Suppose the Structure was Made of Stone. It is Located on a Beach in California, and is Used Only in Taking Motion-Picture Scenes

¶ By charging $2.20 per year for a license to operate a radio-receiving set and turning one-half of this amount over to the broadcasting stations, radio broadcasting is put on a paying basis in Great Britain. The companies make up any additional expense by the sale of receiving sets. Programs will be kept to a very high standard.



The "Logan," a Discarded United States Army Transport Which has been Sold by the Government and will be Converted into a Floating College by Its New Owners: The Yearly Fee at This Floating School will Be $3,000, and Each Year will Include a Trip around the World

## ARMY TRANSPORT TO BECOME FLOATING COLLEGE

The former United States army transport "Logan," one of several of the old-timers in the transport service, is to be converted into a floating college, on which American youths, from 13 to 18 years of age, will be given high-school and college courses at sea. Each year's studies will be conducted in the usual school months, from September to May, during which time the "Logan," or whatever the transport's new name may be, will cruise completely around the world, its home port being Baltimore. This will be the first time that a privately owned American vessel has been used for purposes of this kind, though the United States government and other governments as well, by means of training ships, have given educational advantages to youths while on long cruises.

The "Logan" has just been purchased by a syndicate of Georgia capitalists, who have subscribed funds to finance the deep-sea collegiate experiment. The transport was delivered to their representative at San Francisco in November, last year, and was sent to Baltimore to be refitted as a school ship. Navigation, seamanship, and foreign trade also will be taught on board, in addition to the regular high-school and collegiate branches, but unless students so desire, they need not take these three courses. The ship will start on its first educational cruise at the beginning of September, this year, and students entering will matriculate for full four-year courses.

Prof. Zebulon Judd, dean of the Alabama Polytechnic Institute, has been named head of the educational department, and Captain Williams, who has been in command of the "Logan" for 12 years, is to remain in charge. The plan back of the project is to give the students practical first-hand knowledge of geography, history, commerce, and peoples. The floating school will be expensive, since, according to present announcements, the cost of each nine months aboard the ship will be $3,000 for each boy registered.

## OLD LOCOMOTIVE SUBSTITUTES FOR DISABLED BOILER

During the busy season at a plant the loss of a week's production was threatened by a boiler being put out of commission. The emergency was met by obtaining from the nearest roundhouse an old locomotive that served the purpose of generating steam to keep the plant going, although it had reached the point where it was unfit for active road service.

## NEW BARGES FOR ERIE CANAL ARE ELECTRICALLY DRIVEN

A type of barge, recently developed at Buffalo, N. Y., is expected to revolutionize inland water travel. This new vessel was designed primarily for use on the Erie Barge Canal, but it can, and ultimately will, be used upon other inland waterways of the country, such as the Ohio, Mississippi, Missouri, and other shallow streams which will be navigable to these fast, light-draft, electric-driven boats.

The boat is of entirely new design, and it has required many years of intensive study to bring it to a successful completion. It is a double-decker, with a length over all of 272 feet, and a width of 42 feet. The bottom is flat, and along its center is built an open tunnel running nearly the entire length of the hull. The water contained in this tunnel—120 tons of it, to be exact—serves as ballast. In reality, this tunnel divides the hull into two parts, each containing 42 airtight compartments with bulkheads, thus making the boat practically unsinkable.

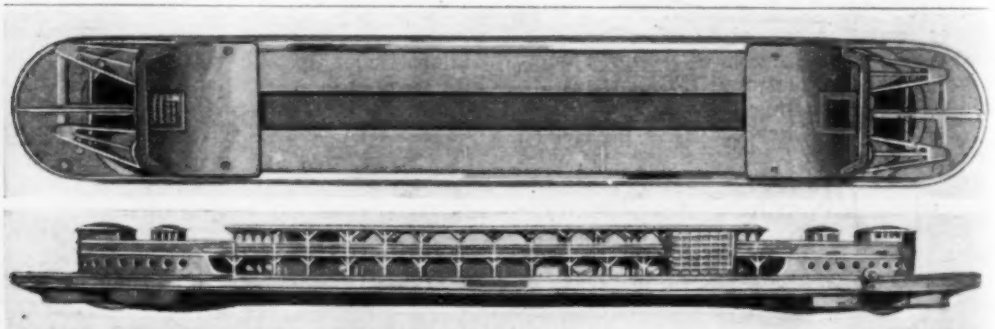
Something new in the way of a steering apparatus has been evolved for use on it. This consists of four swinging pontoon rudders, two at each end of the hull, which make it possible to take sharp turns or warp into dock very quickly. It has two pilot houses, one at each end, from either of which the boat can be controlled. The 12 by 16-foot gangplank can be lowered at any point along the banks of a river, and produce or merchandise can be taken aboard very conveniently. Docking facilities are necessary only at towns and cities where large quantities of freight are handled. At these points loading and unloading are done with electric trucks.

Motive power is furnished by the very latest type of Diesel engine, electric generators and motors, and all auxiliary machinery is electric. Two propellers are used, one at each end of the boat, and each of these can be lowered or raised according to the depth of water navigated. A refrigerator system with a capacity of three carloads is another feature of the boat.

The cost of building a boat of this type is $150,000, of which 75 per cent represents machinery and labor-saving devices. A comparison of this new boat with the old type now in use is rather interesting. The average size of the latter has a deck area of about 1,425 square feet; the crew's living quarters are generally antiquated, and the boats have to be towed. The new type has every possible convenience—hot and cold running water, staterooms, a splendid kitchen and dining room, baths and showers, with electric lights in all parts of the boat, and it possesses about 15 times the deck area of the older boats. And, most important of all, the building cost per square foot is practically the same.

## NEW ELECTRICAL IMPLEMENT SIMILAR TO MAGNET

An electrical device which has the curious similarity to a steel magnet, that it is permanently charged with positive electricity at one end and with negative at the other, and that, if broken into pieces, each part retains this polarity, has been made by a Japanese university student. The process of manufacture is rather involved, but the finished product consists of a rod or bar of a special dielectric material, and is called an "electret," the name being derived from electricity in the same manner as magnet from magnetism.



**Top View of Hull and Side View of Completed Electrically Driven Barge for Erie Canal: It Has a Deck Space of Over 20,000 Square Feet, or About 15 Times That of the Average Canal Barge. Note the Peculiar Pontoon Rudders at Both Ends**

# HYDRAULIC-FILL DAM SOLVES IRRIGATION PROBLEM

Below: Hydraulic Monitor Washing Clay from Bank Used as Fill for the Dam. Right: Measuring Level of Clay Settlement Pumped into the Dam as Indicated by Discharge in Lower Left-Hand Corner

BECAUSE bedrock was too far down to make feasible the building of a concrete dam, the huge mound of earth shown at the center of the picture at the top of the page, was built to impound water in a large irrigation reservoir formed between the hills in San Diego County, California. It contains 435,000 cubic yards of clay, is 600 feet thick at the base, 1,600 feet long, and 117 feet high.

## CHINA-BURNING KILN DESIGNED FOR HOME-STUDIO USE

Firing kilns for the burning of hand-painted china and glassware are now being manufactured in a size designed to be convenient for, and easily operated by, amateurs. The kiln has an inside diameter of 15 inches, is 18 inches in height, and may be equipped with either a kerosene or gas burner. To those interested in this line of work, the new kiln offers an economical means of completing their own product in the home studio.

Firing Kiln for Use in the Home Studio: It may be Equipped with a Kerosene or Gas Burner

## HUNDRED-INCH SLIDE RULE IS VERY ACCURATE

A slide rule in which the scale is 100 inches in length and which can be relied upon to give results in multiplication and division with an error of less than one in 1,000, has recently appeared in England. The scale is laid out in 20 parallel lines, each about 5 inches long, and the rule arranged so that it can be manipulated with one hand.

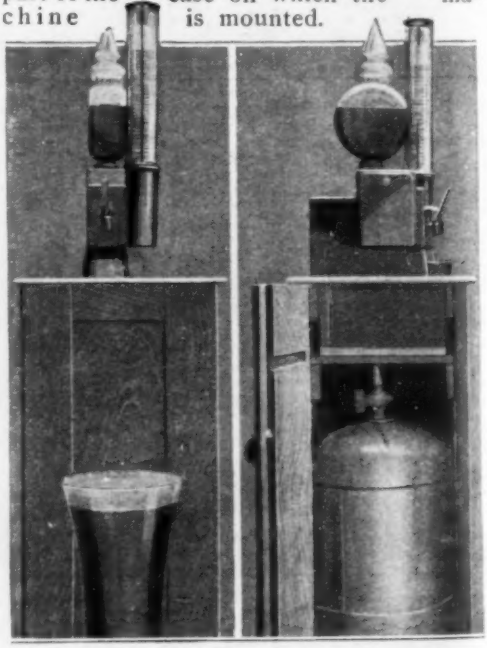
¶The Banff-Windermere Motor Highway, the last link in the great 6,500-mile scenic route through western Canada and the United States, will be officially opened on June 30, this year.

## ASTONISHING GLIDING RECORD SET IN ORDINARY AIRPLANE

An aerial gliding record, recently set by a French military airman, is remarkable not only for the length of time he remained in the air—7 hours 3 minutes—but also by reason of the fact that he accomplished the feat in an ordinary army plane. The performance took place in Algeria, northern Africa, and the plane was in no way altered except that the propeller was immobilized by means of wedges. Besides, the plane carried 500 pounds of extra weight in addition to its normal fuel and oil supply.

## AUTOMATIC VENDING MACHINE DISPENSES SOFT DRINKS

A novel application of the idea long used in the familiar penny-in-the-slot chewing-gum and peanut-vending machines, has been made for the automatic dispensing of soft drinks. The purchaser drops his coin in the slot, pulls the operating lever, and shortly receives a sanitary paper cup into which the proper portions of flavoring sirup and carbonated water have been discharged. A supply of flavoring sirup is kept in a glass container on top of the machine, and the carbonated-water drum is placed in the bottom part of the case on which the machine is mounted.



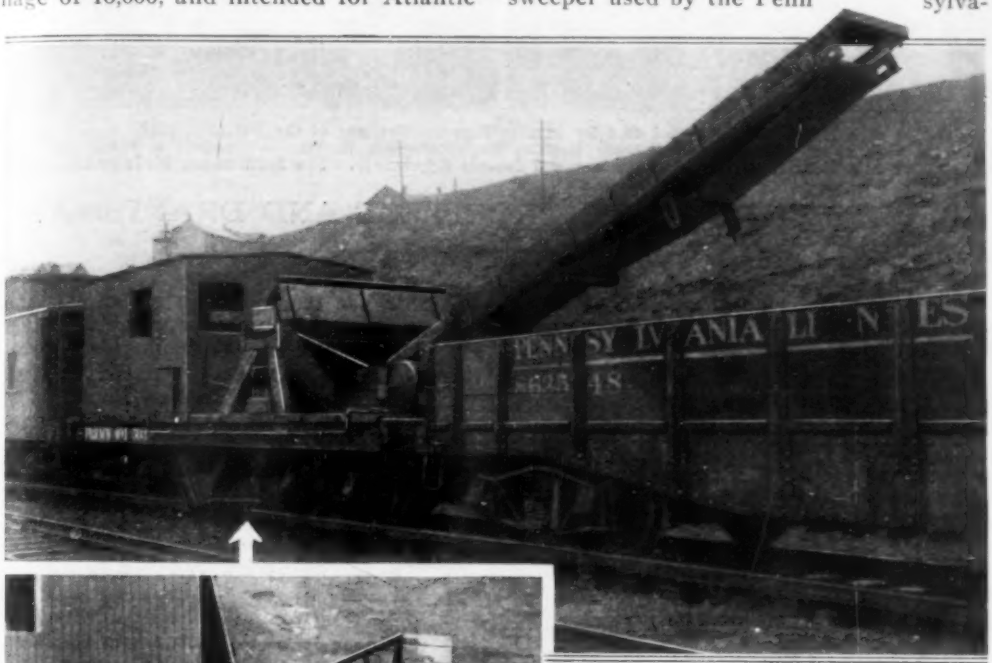
Left: Front View of Automatic Vending Machine for Soft Drinks. Right: Machine with Front Panel Removed, Showing Carbonated-Water Drum

## "ORCA" FINALLY COMPLETED FOR ATLANTIC SERVICE

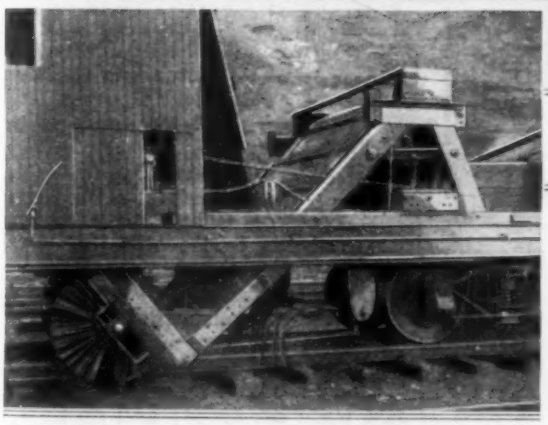
The "Orca," a new liner having a length of 575 feet, a beam of 67 feet, and a tonnage of 16,000, and intended for Atlantic service, was recently berthed for the first time at Southampton, England. Construction of this ocean liner was commenced some 10 years ago, the beginning of the late war causing the builders to suspend operations. During the war, the shortage of ships caused the owners to resume construction, although not according to original plans, but as a supply ship. At the conclusion of the conflict, however, the hull was overhauled, the war-time equipment and fittings removed, and the ship refitted as a liner.

## MOTOR-DRIVEN TRACK SWEEPER HALVES CLEANING COST

One-half the usual cost of cleaning tracks is saved with a power-driven track sweeper used by the Penn sylvania Railroad in its Allegheny Mountain sections. The sweeper consists, fundamentally, of a rotary steel broom, 3 feet in diameter and 7 feet long, suspended beneath an old flat car. Driven by a gasoline engine mounted on the car, the broom sweeps the dirt and ashes onto a steel pan. Then a conveyor belt carries the accumulations up and forward, and deposits them in an open-top car, coupled ahead. Four miles an hour is the average speed of the car during operation.



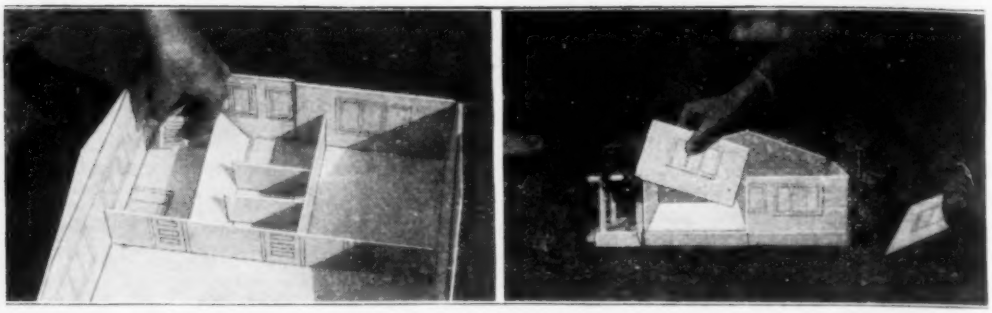
General View of the Track Sweeper Used by the Pennsylvania Railroad, Showing the Conveyor Belt and Receiving Car



Close-Up of Steel Broom, Showing the Manner of Its Mounting and a Set of "Fingers" Ahead of It That Loosens Up the Dirt

## ALMOST PURE SEAM OF SALT FOUND IN NOVA SCOTIA

Salt recently discovered at Malagash, Nova Scotia, was pronounced 99.1 per cent pure after analysis. The seam is at a depth of 200 feet, and is 6 feet thick. Potash has also been encountered at two levels in the salt strata, and it is thought that more will be found at greater depth.



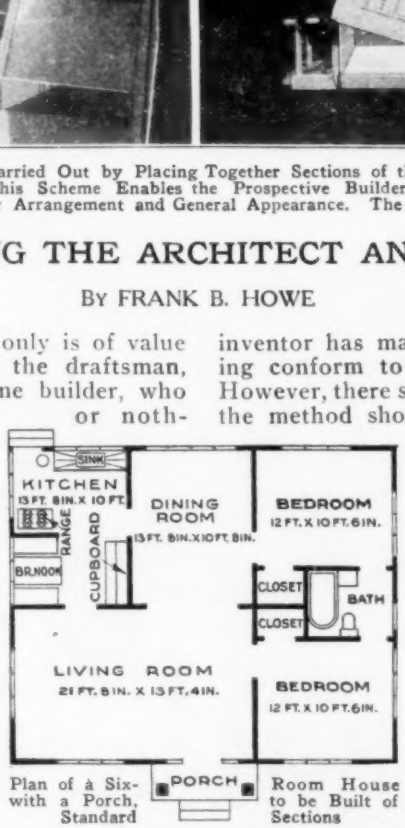
The Design of a House being Carried Out by Placing Together Sections of the Building, Made to a Scale of One-Half Inch to the Foot: This Scheme Enables the Prospective Builder to Produce a Model for His House with Any Desired Interior Arrangement and General Appearance. The Sections are Made of Cardboard

# SUPPLEMENTING THE ARCHITECT AND DRAFTSMAN

By FRANK B. HOWE

A SYSTEM which not only is of value to the architect and the draftsman, but also enables the home builder, who probably can tell little or nothing from plans and blueprints, to see exactly what his finished house will look like, has been patented and used to advantage in the West.

The inventor of the system is also the inventor of a method of building ready-cut houses, and this work led him to develop a "unit" system. This new type of house consists of standard sections, which can be fitted together and arranged in any one of innumerable combinations, instead of the limited number of styles of ready-cut houses. Hence the prospective builder can visualize his own plans and style of house, yet have the advantage of the low cost of materials which the quantity production of the factory-built house affords. The inventor has made his system of designing conform to these standard sections. However, there seems to be no reason why the method should be restricted to that field only. It is easily applicable to any other.



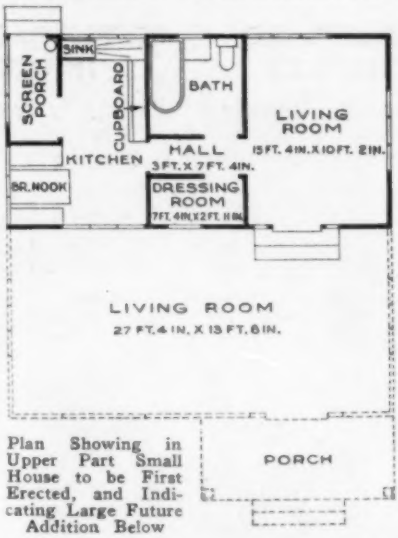

Plan of a Six-Room House with a Porch, to be Built of Standard Sections

The plan is nothing more than a glorified doll-house building. Sections of siding, roof, partition, etc., are supplied, reduced to a scale of ½ inch to 1 foot, and built of cardboard. The intending builder takes these pieces and with them builds miniature houses according to his taste, until he gets a style and appearance that suit him. He sees just what his house will look like when it is done, for the miniature pieces are cut exactly to scale.

When a model house that suits the buyer has been put together, he simply turns it over to the builders and says, "Go ahead." There is much less need of blueprints and wash drawings; and no hope-

Two Completed Miniature Models of Houses: The Full-Size Buildings are Erected in Accordance with the Models with Standard Sections That Correspond on an Enlarged Scale with the Cardboard Sections of Which These Models are Constructed. The Latter Sections Are Interchangeable, Permitting Great Variation in Design

less endeavor on the part of the architect to convey to the amateur mind what the house is going to look like. Instead, the builder of the house puts his model together exactly as he wants the house to look. If anyone in the family has a liking for painting, different color combinations for the rooms can be tried out by painting the model with water colors. A furniture company cooperates by supplying little models of various pieces of furniture, all made exactly like the original and corresponding to the scale of the house.




Plan Showing in Upper Part Small House to be First Erected, and Indicating Large Future Addition Below

In short, the resourceful inventor plans to offer his customers a method of seeing just what kind of houses they are getting, before they get them.

¶Claiming that radio aerials attached to light poles or stretched across light wires were too dangerous to be tolerated, the head of the Kansas City light and power plant ordered more than 300 torn down.

## NEW SUBMARINE POWER CABLE IS SEVEN MILES LONG

A seven-mile submarine cable, reported to be the largest and longest ever employed for this purpose, has just been laid across San Francisco Bay to bring additional hydroelectric power into San Francisco and reduce the load on the steam-driven plants. It is a three-conductor cable, slightly over ¾ inch in diameter, and at 11,000 volts will be capable of transmitting 10,000 kilowatts. Because of its unusual size, the cable was not placed on reels but was shipped from the factory in nine gondola cars in which it was coiled in 4,800-foot lengths. These lengths were later spliced together into one 38,500-foot length which was coiled on a special cable-laying barge. This method has long been used for telegraph and telephone cables but never before for a power cable.

¶Consuming 102 pounds per person, America in 1922 established a record as a sugar-eating nation, according to data collected by a large refining company. The figures were based on an estimated population of 110 million.

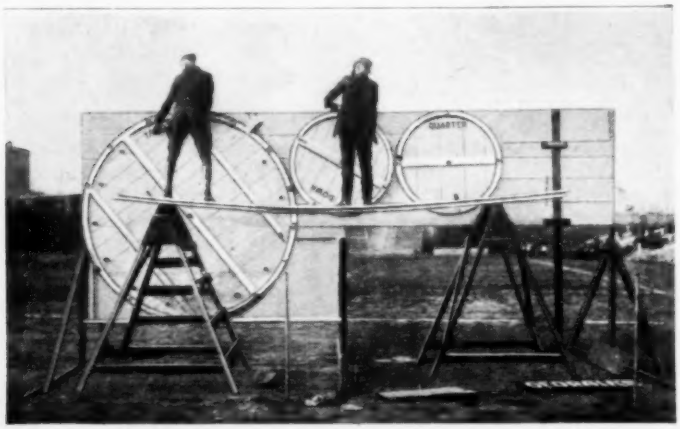
## SPECIAL TROLLEY FOR SKIERS ON NORWEGIAN RAILWAY

Native devotees en route to the skiing ground at Holmenkollen, near Kristiania, Norway, have a special car to carry them and their skis. On the outside, along the bottom of the car, is a narrow troughlike projection holding the end of the skis, and supporting them, while chains along the middle of the car keep them from falling off. It is not uncommon to see the skis piled on so thickly that the windows of the car are almost entirely hidden.

This Trolley Car is Run as a "Special" for Skiers en Route to the Skiing Ground at Holmenkollen, near Kristiania, Norway. Chains along the Middle of the Car Hold the Skis

## NEW FOOTBALL SCOREBOARD HAS MANY ATTACHMENTS

A new football scoreboard, recently erected on an athletic field at Montgomery, Ala., has several novel attachments for displaying the score. The board is mounted within easy "reading distance" of the spectators and has revolving disks that indicate the "quarter," whose "ball" it is, what "down" and how many "yards to go," whether or not it is the "last five minutes," and also the total score by quarters. The result of every play during the game is wigwagged from the sidelines by a cadet, the signals being interpreted at the board by another cadet, who orders the changing of the marking mechanism in accordance with the progress of the contest, thus giving the spectators timely information.



Above: Rear of Football Scoreboard, Showing the Wheels That are Revolved to Change the Notices on the Front of the Board. Below: Front of Board as It Appears When in Use

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¶Our Bureau of Information will answer all questions regarding articles appearing in this magazine.

## SIMPLE BALANCING MACHINE IN USE IN GERMANY

In rapidly rotating parts, such as pulleys, flywheels, crankshafts, and rotors, it has long been the practice in this country to establish in them as perfect a dynamic balance as possible, apart from any simply static balance, and to do this, elaborate and expensive balancing machines are necessary.

In a new method, recently put into practice in Germany, the body to be tested is mounted in two bearings, fitted to vertical springs so that, when rotating, if there are any unbalanced parts the body will oscillate. When being tested, the body is driven till it reaches a high speed, when the driving power is cut off, and the body is allowed to run freely in the flexible bearings. As it gradually slows down, the oscillations are recorded graphically by means of an indicator coupled to the rotating body. The whole operation is repeated with the work rotating in an opposite direction. By this means the necessary balancing weights are easily determined in two or three comparative tests. For bodies rotating at high speed, a third and even a fourth balancing operation, similar to the first, is advisable.

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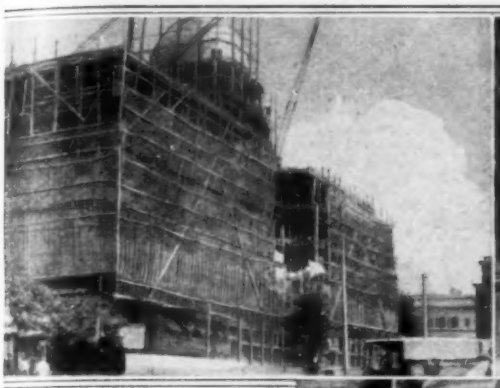
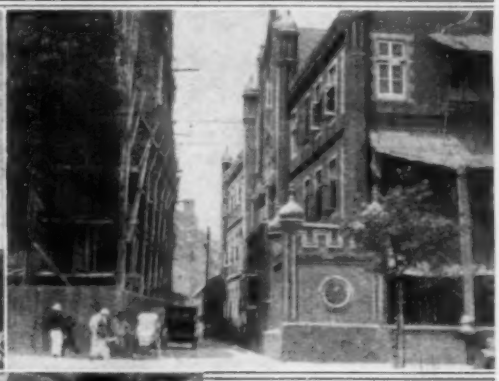
## DAIREN, NOT BOSTON, WORLD'S FOREMOST "BEAN TOWN"

With a never-ending procession of ships carrying away tons of soy beans, Dairen, a Japanese city in Manchuria, is challenging Boston's reputation as the "bean town" of the world. Dairen, according to reports, is the port of what is becoming the greatest bean-raising country of today. The product, also used in making soy-bean sauce and soy-bean oil, is exported to various markets. The soy-bean sauce is familiar to patrons of "China-town" restaurants.

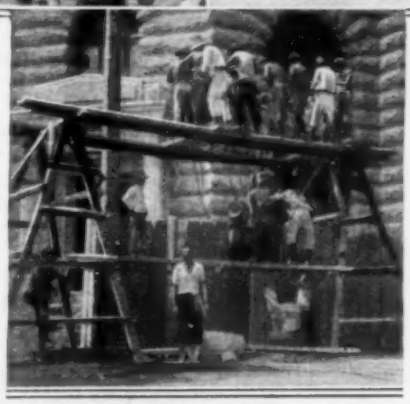
# MUDDY SITE OF SHANGHAI BAD FOR FOUNDATIONS



New Building of the Hongkong and Shanghai Bank Which Has Sheet Piling Surrounding the Foundation



Corner of New Bank Building: Opposite to It Is the Customhouse, the Foundation of Which was Endangered



Driving Sheet Piling by Man Power for the Purpose of Holding the Slimy Mud in Place beneath the Foundation of the New Bank Building in Shanghai

While not in quite so precarious a predicament as a house built upon sand, Shanghai, China, is not much better off, for it is a city built upon mud, and very slimy mud at that. From this, naturally, results a great deal of difficulty with foundations for heavy structures. The first step necessary before erecting the superstructure of anything like a large building, is to surround the whole foundation with a wooden inclosure like the cofferdam used in laying the foundation of a bridge pier. While erecting a large reinforced-concrete building recently on the river front of Shanghai, the foundation of the neighboring large customhouse began to move, on account of the displacement of the slimy mud by the weight of the new building. It was necessary to sink heavy upright timbers, like sheet piling, along the walls of the customhouse, and to tie them together with long steel rods to prevent the pressure of the mud from forcing them outward.

## BENCH CLAMP MAKES HAND VISE MORE USEFUL

A hand vise of recent design that has a grip capacity up to 1½ inches, is furnished with a bench clamp that greatly increases its usefulness for home and shop work. Applied to a bench, the vise can be turned to any point in a circle to suit the convenience of the user. The ball-end handle for tightening the jaws, instead of the wingnut commonly used on hand vises, is an added feature.

The Usefulness of the Hand Vise is Increased by Means of the Clamp Which Fastens It to a Bench Where It can be Turned to Any Point in a Circle

¶Pint and half-pint bottles of chocolate-flavored milk are being sold by a Chicago dairy company in addition to its regular supply. The new drink tastes somewhat like a chocolate malted milk.

The Auto-Tourist Park of Boise, Idaho, a View of Which is Given Here, Has a Hot-Water Supply from Natural Wells, One of the Pumping Stations being Shown to the Left. The Park Also Has a Dining Pavilion, a Laundry, and a Rack for Washing Cars

Mail Reaching Burkesville, Kentucky, must Come 40 Miles over Red-Clay Roads and Bridgeless Creeks. In Winter, It is Brought in Covered Wagons of This Type, Two Days Often being Required to Make the Trip

Market in Bloomington, Illinois, Run by an Organization of Farmers Selling Direct to the Consumer: It is Said to Be the First of Its Kind, and an Entire Success

# AND ENJOYMENT OF VISITORS AND RESIDENTS

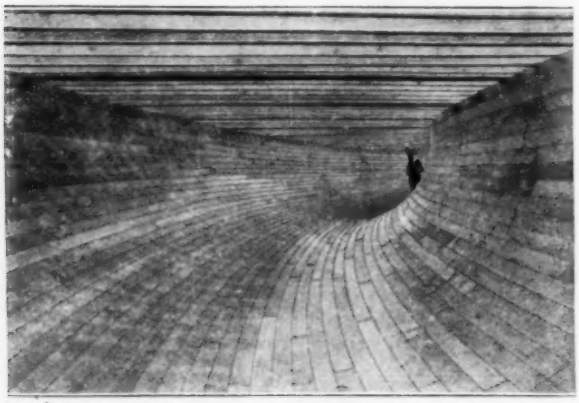
Sign Marking Land Acquired by the City of Santa Rosa, California, and Its Chamber of Commerce, to be Made into a Memorial Garden in Honor of Luther Burbank, Who Lives in That City and Was Present at the Dedication

Once a Bandstand Erected by the Women's Civic Club and Presented to the City, This Structure Now Serves as the Chamber of Commerce Building in Pacific Grove, California

The Observatory Pictured Here was Built by the City of Des Moines, Iowa, with Funds Obtained from a Bond Issue

By Building This Dam below the Falls of a Creek, the Citizens of Pendleton, Indiana, Made a Swimming Pool Which is Filled with Fresh Water Every 10 Minutes

## EXACTING REQUIREMENTS MET BY WOODEN FLUME



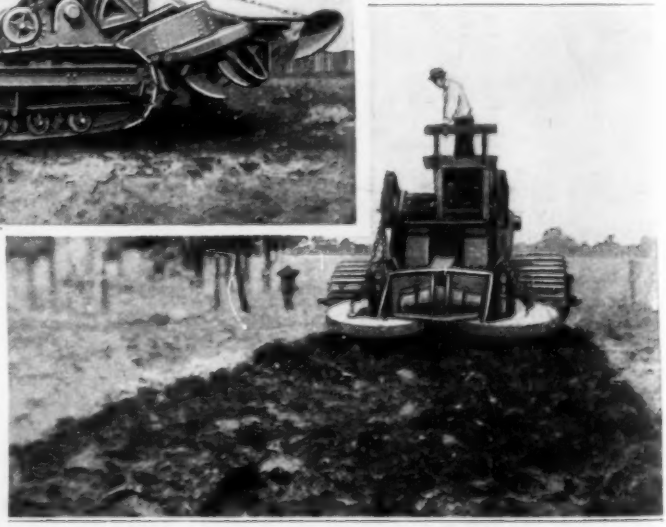
View Showing the Curve of 100-Foot Radius to Which This Wooden Flume was Constructed in Spite of the Fact That It was Pronounced by Many to Be Impossible

A wooden flume was recently built to conform to conditions that had been considered by some as being impossible of execution. The flume, which was elliptical in section with the bottom forming a curve of about 10-foot radius and the sides one of 6-foot radius, was constructed on a curve of 100-foot radius. The length of the section was 200 feet, and after 100 feet of the flume had been laid, the thickness of the staves was reduced from 2¼ inches to 1⅛ inches, requiring a very difficult joint to be made. The principal staves of this flume were made of carefully selected kiln-dried Douglas fir.

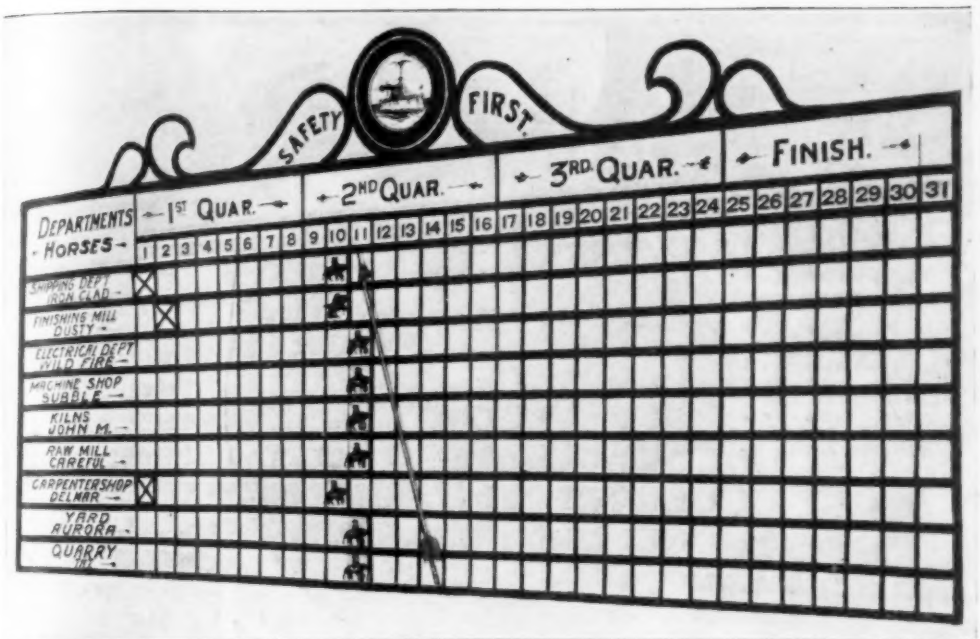
## ROTARY PLOWS PREPARE SOIL FOR SUGAR CROP

A powerful machine that plows and pulverizes the ground to a depth of 20 inches, and opens up furrows for the planting of sugar cane, has lately been shipped to Porto Rico for trial under actual working conditions. A heavy hinged frame at the rear carries two sets of plows arranged in a circle and geared to revolve in opposite directions. The plows rotate on an incline so that they enter the ground gradually, going deeper as they move toward the rear until they reach the full depth. The soil is not turned over as with the ordinary plow, but the lumps are forced against one another so that they are broken up. The machine is driven through gears by means of a 100-horsepower gasoline engine, and when plowing to a depth of 20 inches, will prepare about one acre of light soil an hour. The plows cut more than the width of the machine.

Side View of Powerful Machine Recently Built for Tillage of Sugar-Cane Soil in Porto Rico: Note Inclined Plow Frame



Rear View of Tillage Machine in Operation: It Plows More than the Width of the Machine and So does Not Travel over the Freshly Broken Ground


SAFETY FIRST
DEPARTMENTS - HORSES →
← 1ST QUAR. →
← 2ND QUAR. →
← 3RD QUAR. →
← FINISH. →
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
SHIPPING DEPT IRON CLAD
FINISHING MILL DUSTY
ELECTRICAL DEPT WILD FIRE
MACHINE SHOP SUDDLE
KILNS JOHN M.
RAW MILL CAREFUL
CARPENTERSHOP DELMAR
YARD AURORA
QUARRY

This Chart was Designed in the Form of a Horse Race to Add Interest to a Safety-First Drive at a Large Cement Plant. Each Day a Department Passed without an Accident was Marked by an Advance of One Square on the Chart

## "FAKE" HORSE RACE AIDS SAFETY-FIRST DRIVE

A novel contest was recently staged in a large cement plant, the object being to eliminate accidents. The contestants were the employes of the nine departments of the plant. They were divided into nine groups, each provided with a horse, and the contest was entitled "safety horse race."

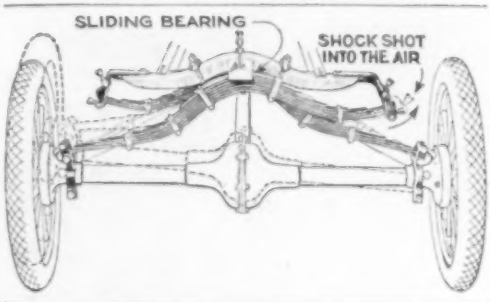
The horse of each department was started from "scratch" on a chart divided into squares. Each square on the chart represented a day. For each day in which no accident occurred in a department, the horse representing that department was advanced one day, or a square on the board. The horses all had names, some of them indicating the work or special hazard in the particular department represented.

For minor accidents which were a little too serious for first-aid treatment only, one-half day was marked off, and for accidents requiring only first-aid treatment, the department lost one-fourth of a day.

The human element is a strong factor in 90 per cent of the accidents, it is claimed, and it was for the purpose of overcoming this human-element problem that a concerted drive to eliminate accidents, by instilling unusual interest in it, was worked out in this manner.

## NEW REAR-SPRING SYSTEM FOR SMALL CAR

A new rear-spring system for lightweight cars is said to act in the capacity of a shock absorber or snubber in lessening the effects of a jolt when one of the rear wheels drops into a depression or strikes an obstruction, as well as to serve the primary function of the usual spring which it replaces. It consists of two separate cantilever springs, the ends of each being attached to the rear axle and




Illustrating Action of New Rear-Spring System When Left Wheel of Car Strikes an Obstruction, Shock being Deflected to Right

frame in such a way that they cross at the center of the rear cross member of the frame, which they support at that point by means of a sliding bearing.

# SOME NOVEL AND LITTLE-KNOWN ACCESSORIES

Fork Cleaner Which Consists of Four Small Brushes through Which the Prongs are Pushed Back and Forth to Remove Any Foreign Matter Adhering to Them

Comb for Applying Hair Preparations without Getting the Fingers Dirty: The Prongs Are Hollow and Exude the Liquid When the Rubber Magazine is Squeezed

Mixer Which Aids in Preparing Mayonnaise Dressing for Sea Foods, Salads, Vegetables, and the Like: The Ingredients are Placed in the Bowl and the Funnel is Filled with Olive Oil Which Drops Out

Separator That Removes the Cream from a Milk Bottle by Merely Squeezing the Rubber Bulb on the Handle

Boiler That is Perforated, Thus Permitting the Water to be Drained from Vegetables without Burning the Hands

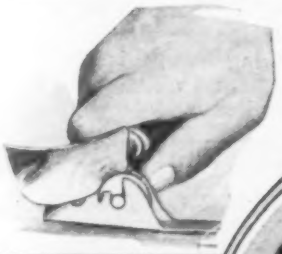
Manicuring Buffer in Which the Scissors, Nail File, Orangewood Stick, and Emery Board may be Concealed

The Chair and Smoking Stand Above, Made of Palm-Tree Stems, Are Artistic, Light, and Durable

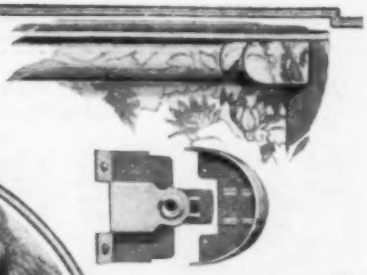
Toothbrush Sterilizer Which Holds Five Brushes and Paste While being Disinfected by Antiseptic Fumes

*Anyone wishing further information on devices described in the editorial pages can*

# INTENDED FOR THE HOME AND ITS MEMBERS



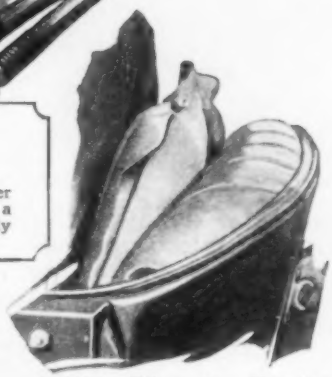
This Knife Sharpener Consists of Two Stone Rollers, between Which the Blade is Drawn from the "Heel" to the "Toe," Thus Producing a Very Keen Cutting Edge



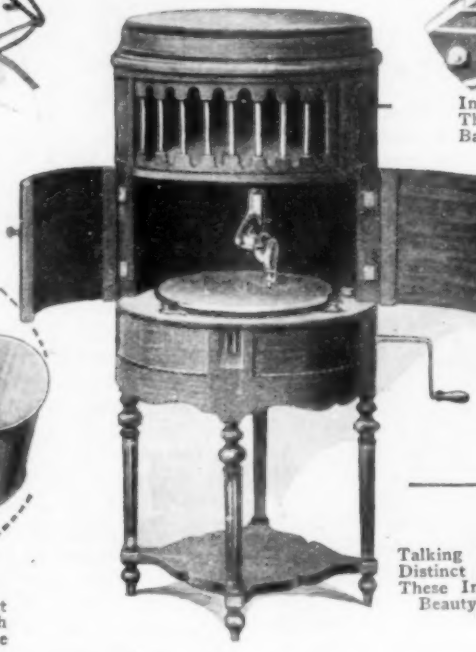
Two Views of a Shade-Roller Hood Which Permits the Artistic Covering of the Shade-Roller Ends and Brackets, and Consequently Aids in Beautifying the Interior of the Home

Electrical Marcel Waver Which Is So Simple to Operate That Any Woman may Quickly Learn to Wave Her Own Hair, Thus Saving the Expense of a Hairdresser: It is Claimed to Be Equally Effective on Dry or Oily Hair

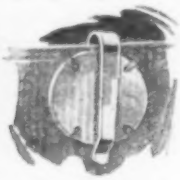
Clothesline Reel with a Special Handle That Acts as a Brake, Preventing the Line from becoming Soiled



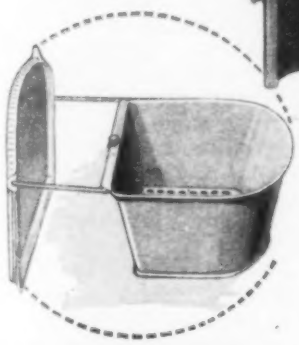
Inflated Pillow for Motorists That Gives the Body an Even Balance at All Times, Thus Preventing Backache



Talking Machine Which Presents a Distinct Departure in the Design of These Instruments and Adds to the Beauty of the Home Furnishings



Combined Hook and Button Which Provides an Easy and Efficient Means of Fastening Suspenders or Belt



Sanitary Sink Strainer That Has a Special Lid to Catch the Drippings When the Strainer is being Emptied

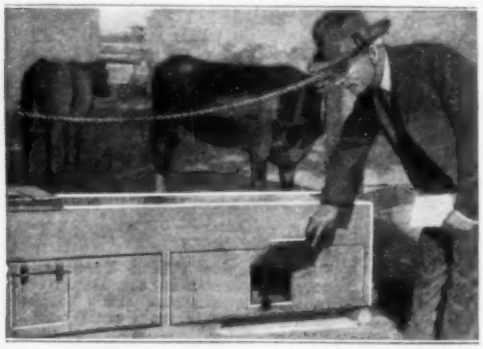
*obtain it by addressing Bureau of Information, Popular Mechanics Magazine, Chicago.*

## TRAVELING MIXER SERVES BATTERY OF VATS

A traveling mixer has been designed that eliminates the necessity of an individual stirring device for each tank or vat in a plant where a large number are used in the same or similar stages of the process. It consists of a traveler suspended from a single rail that carries the agitator drive, which is fitted with an extension shaft long enough to accommodate the deepest tank to be served. To the lower end of the shaft is fastened a heavy-duty rotor or paddle wheel. It is driven by an electric motor.

## IMPROVED WATERING TROUGH HEATED BY TWO LAMPS

The water need never freeze in a new trough designed to be heated by two small lamps. Of medium capacity and lined with galvanized iron, there is nothing unusual in the construction of the tank, except that beneath what would ordinarily be the bottom of the trough, is a long compartment, built somewhat in the nature of a false bottom, and it is here that the lamps are placed. In addition to the heating feature is a float-and-valve arrangement which keeps the trough always filled.



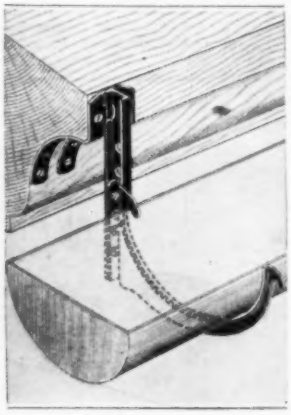
**The Water in This Trough is Kept from Freezing by Two Lamps in a Lower Compartment, One Section of Which is Shown Open**

## HUGE POWER DAM PROJECTED IN PROVINCE OF QUEBEC

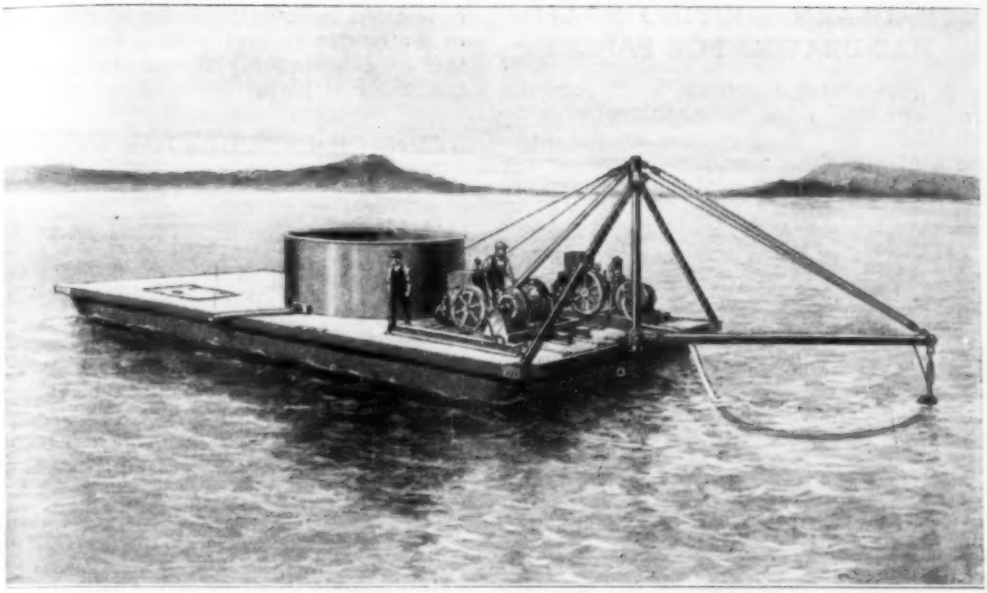
For the development of 1,200,000 horsepower, a dam is to be built at the Grand Discharge from Lake St. John, the headwaters of the Saguenay River, in the Province of Quebec. In the erection of the dam an expenditure of $12,000,000 is contemplated. A Quebec development company has announced its intention of making use of the water power in two large mills to be erected for the manufacture of wood products and paper.

## IRON EAVES-TROUGH HANGERS THAT ARE EASY TO SET UP

For eaves troughs, or hanging gutters, wrought-iron supports that can be connected to the rafters, or nailed against ogee moldings, have recently been patented. In both cases each support is connected to a channel-iron shank which is perforated at short intervals along its whole length for bolting to it a bracket for the gutter. The shanks are of different lengths, enabling the roofer to arrange them so that the gutter can be given a suitable slope. There are no crossbars over the top of the trough, and nothing to hold leaves or other rubbish, and thus interfere with the drainage.



¶An independent police force under the direct command of the president has been formed with the thirty-odd policemen detailed at the White House. The new organization will wear a uniform of navy-blue serge, and will probably become a permanent institution.



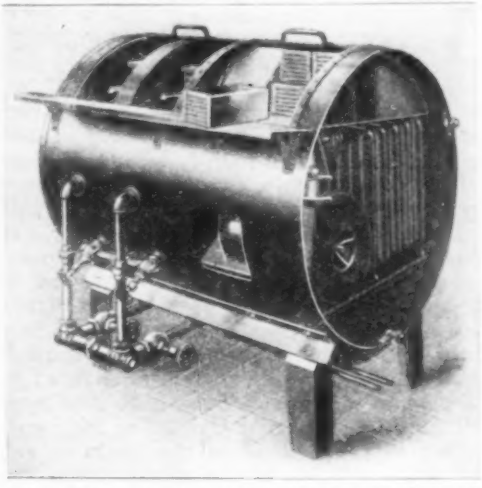
Apparatus for Skimming Waste Fuel Oil from the Surface of the Water in the Harbor of Baltimore, Maryland: On Board the Scow Is a Pump in Connection with the Hose, the Intake End of Which is Suspended from the End of the Boom. The Tank Is for Separating the Oil from the Water

## FUEL-OIL SKIMMING DEVICE FOR BALTIMORE HARBOR

To keep Baltimore harbor free from floating fuel oil, which is a constant fire menace, the city authorities have constructed an effective skimming apparatus. It consists of a suction pump mounted on a scow and connected with a hose which is slung overboard with its intake end suspended from a boom and held just below the surface of the water. When the pump is in operation, water and oil, after being sucked through the hose, are discharged into a settling tank on board the scow. In this tank, when the water has been separated from the oil by settling, it is discharged through an outlet pipe, and the oil is then removed for storage in barrels. This oil-skimming scow will be operated in the same manner as a fire boat, being maintained at a permanent station, ready at a moment's notice to respond to calls sent in by the inspector who patrols the harbor for the detection of oil.

## MACHINE WASHES AND DRIES RESTAURANT SILVERWARE

The flat silverware of restaurants, hotels, or other large catering establishments may be quickly washed and dried with a new improved machine. It consists of a copper cylinder, about 3 feet in diameter and 6 feet long, laid lengthwise on a low stand. A removable section is at the top of the cylinder, and beneath are three compartments, the first two fitted with perforated baskets which revolve on racks, while the third is connected with a fan and a radiator just under it. In use, the silverware is placed in the baskets of the first compartment and revolved through a hot washing solution, then removed to the second, where it is whirled about in a rinsing solution, and finally put into the drying chamber, where the heated air evaporates all the moisture.



The Washer with One End of the Cylinder Exposed, Showing the Radiator and Fan under the Drying Chamber

## CHAIR-ARM WRITING BOARD HAS DRAWER FOR PAPERS

A new portable writing "desk" consisting, roughly, of a rectangular board so padded that it may rest on the arms of a chair without marring the finish, has been especially

Below, the "Desk" is Shown in Use, and Above with Its Top Opened, Displaying the Drawer for Writing Material, and the Book Rest

fitted with a drawer for holding writing material. This drawer runs lengthwise under the forepart of the desk and is reached by lifting the upper surface of the board, hinged at the front edge. Another feature is a small finger, on the edge nearest the writer, which may be swung up to serve as a book rest.

## NOVEL MEANS FOR DISPOSING OF SURPLUS WATER POWER

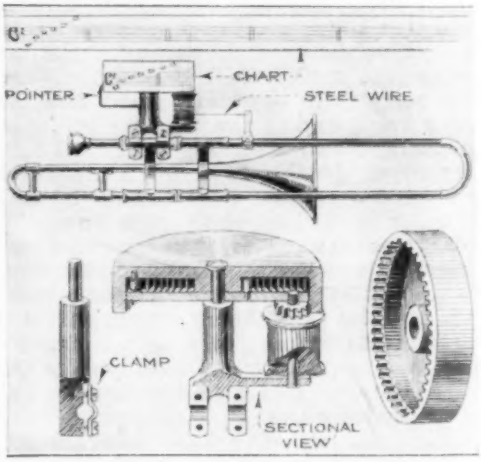
In many water-power stations it is necessary to provide for the escape of surplus water, and in high-head installations this causes trouble, especially in instances where there is no natural channel of easy gradient for the escape of the water. In such cases this difficulty has been overcome in England by the use of a hydraulic brake. This consists of a ring of small nozzles mounted around a cast-iron box, which is placed in the center of a shallow concrete basin. The water is delivered by a pipe to this box, from which it escapes in the form of radial jets. The eddy currents established when the basin is full of water dissipate the energy, and the water flows quietly over the brim of the basin to the tailrace. Brakes of this kind have been built that handle 18 cubic feet of water per second with a head of 500 feet in a basin only 20 feet in diameter and 6½ feet high.

## FURNACE CALCULATOR FIGURES WEIGHT OF ALLOY NEEDED

A calculator of the circular slide-rule type has been marketed to simplify the work of determining the quantity of ferro-alloy or pig-iron addition necessary to a furnace charge of a given mixture. It consists of a large and a small circular disk, and one segmental disk, on which are provided scales for weight of charge, percentage of alloy or carbon to be added, grade of alloy, and efficiency of absorption, per cent melting loss, and weight of alloy addition.

## NEW POSITION INDICATOR FOR TROMBONE SLIDE

Of great help to the student is a new attachment for the trombone that not only indicates the position of the slide but also points on a scale to the corresponding note. The position is indicated on a revolving spool on which is wound a wire that is attached to the trombone slide. This spool is geared to a pointer that moves around a drum above the spool. On the outside rim of the drum

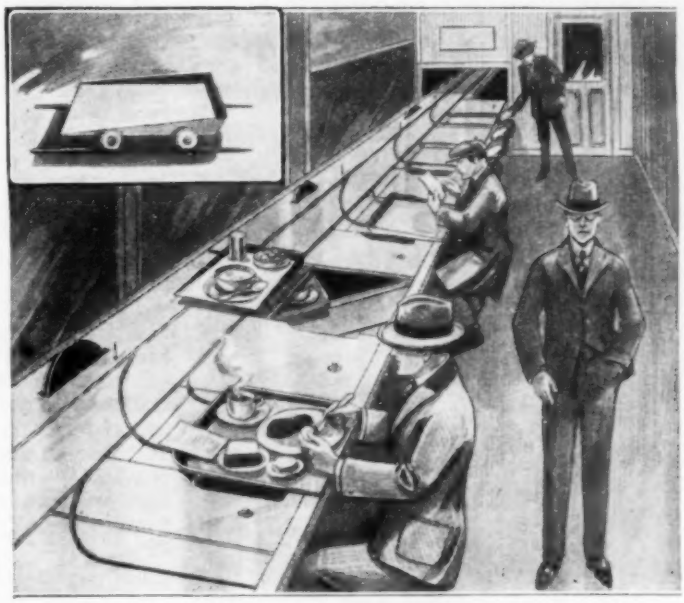



Complete Assembly of the Indicator is Shown and Noted on the View of the Trombone. Below, the Various Parts are Shown Enlarged and Partly in Section

are printed scales, and the indicator always points to the note corresponding to the position of the slide. The device is readily attachable and detachable.

## AUTOMATIC SERVING COUNTER FOR LUNCH ROOMS

An automatic serving counter for lunch rooms and restaurants is intended to eliminate the need of waiters. When the customer enters a restaurant where one of these appliances is installed, he finds a clean tray, having tiny wheels, and a menu card before his seat. After checking off his order on the card, which is later used as a pay check, he places it on the tray, pushes a button, and the wheeled tray travels on a track to the kitchen. Here, the cook fills the order and sends the tray back to the counter. At the completion of the meal, when the customer rises from his seat, the tray travels again to the kitchen with the soiled dishes.



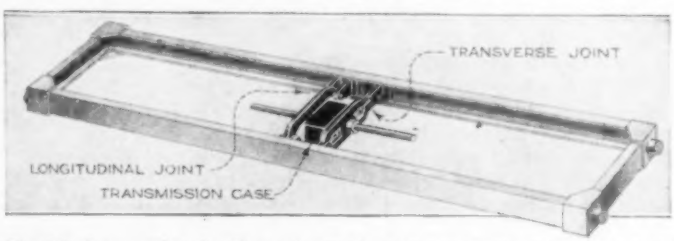
Automatic Serving Counter, Showing How the Wheeled Trays are Operated over Tracks to Bring the Food from the Kitchen and to Carry Back the Soiled Dishes: Insert Shows One of the Wheeled Trays

## MILLIONS OF CROWS MENACE CANADIAN FRUIT CROP

Although more than 70,000 crows have been killed in British Columbia in the last two years, and thousands more are being slaughtered each month, the Game Conservation Board of that province estimates that there are still 7,000,000 of these birds within its borders. The crows, according to the board, not only destroy corn and fruit crops, but, in feeding upon the eggs of the smaller insect-eating birds, harm the farmer to an extent that cannot be calculated. To encourage the shooting of these pests, a bounty of 20 cents is paid for each crow. Owls and eagles are paid for at the rate of $1 each.

## MOTOR-TRUCK TRANSMISSION FLEXIBLY SUPPORTED

In an extra-long motor truck, where the transmission is located at the center of the frame in order to shorten the unsupported length of the drive shaft, the transmission has to be carried on two parallel cross members, the ends of which must be connected to the side members of the frame. If such end connections are rigid, any torsion of the frame when riding over rough roads will be transmitted to the transmission case, and in order to take care of this, special joints between the cross members and the frame have been devised, and are the subject of a recent patent. The cross members carrying the transmission case are hinged at each end, where they connect to the side members of the frame

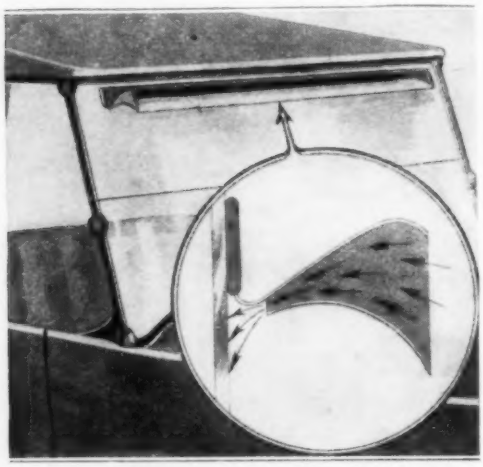



Flexible Support for the Transmission Case in the Center of the Frame of an Extra-Long Motor Truck: The Cross Members Carrying the Transmission Case are Hinged at Each End to Provide Thorough Flexibility

In one case, the hinges act longitudinally, and in the other transversely, so that there is flexibility in both directions.

## NEW WINDSHIELD CLEANER USES WIND PRESSURE

A new windshield cleaner, that is entirely automatic in action, utilizes the wind pressure against the windshield



This Device, Which Attaches to Windshield by Means of Adhesive, Utilizes the Wind Pressure to Clear the Glass of Rain

when the car is in motion, as a means of keeping the glass clear in rainy weather. It consists of a nozzle-shaped piece of metal, which is attached to the windshield with a suitable adhesive and which directs a current of air against the glass, causing the rain spots to merge and run off at the bottom.

## ENDLESS-TREAD TRACTORS BUCK SNOW IN UTAH

The United States mails for the Uinta Basin in northeastern Utah, an isolated agricultural empire of more than 25 villages and a population of many thousands, are being forced through the snow-filled mountain passes in automobile trucks piloted by a fleet of track-laying tractors, this winter.

Heretofore the basin has been served with the mails—when it was served—from Colorado points in a very roundabout way; in fact the towns of Vernal, Roosevelt, and Duchesne, which are among the best country towns in Utah, have often been without mail for weeks when the snow was deep in the mountains.

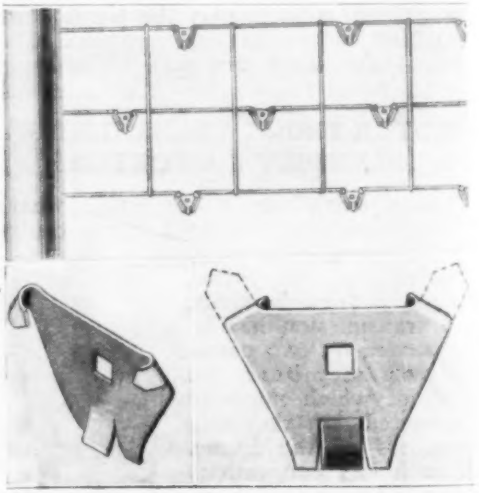
An immense amount of parcel-post matter goes into the basin, including such articles as building bricks, certain forms of lumber, all kinds of merchandise and foodstuffs, and in fact everything a thriving region needs. A stoppage of the mails even temporarily causes a great accumulation at Price and Helper, the railroad supply points.

The crest of the divide on the road to Duchesne is nearly 9,000 feet above sea level, and for nearly 20 miles the snow sometimes accumulates several feet in depth. The tractors have been shuttled over the pass continually since the first deep snow of the winter, often going through rather than over the snow, but managing to pack a roadway for the passage of the heavy mail trucks.

The trucks, however, lose their traction in the tractor tread, and the latter are thus used to tow the trucks over the hump. As a demonstration, recently, two tractors hauled a train of seven loaded parcel-post trucks and one touring car over the summit, where but a few hours previously the snowdrifts had been 10 feet in depth and the general layer 4 or 5 feet deep.

## TRIANGULAR METAL CLAMP FOR TIGHTENING WIRES

A metal clamp for taking up the slack in fence wires, and thus tightening them, has recently been patented. The clamp is in the form of a small triangular plate with fingers at one corner for engaging the wires and extensions at the other corners. In the center of the plate is a square hole for the insertion of a tool by



Triangular Clamp for Taking Up the Slack in Fence Wires, Operated by Inserting a Tool in the Square Hole in Center of the Plate, and Twisting the Wire

means of which the wire is twisted, until the two extensions can be bent over it, clamping the wire in a triangular loop.

## MUD-SPLASH GUARDS TESTED WITH WHITE SCREENS

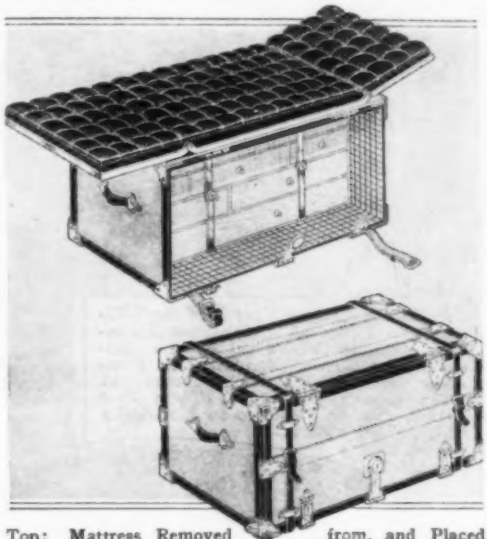
Automobiles fitted with various devices for preventing mud splashing were run through a muddy lane and past white screens, in a recent contest held by the British Royal Automobile Club. None of the guards was considered sufficiently efficient to merit an award, though more than 36 were entered in the trial. Among the many types seen was a flangelike attachment that revolved with the wheel, a hanging curtain suspended from the hub cap, and a curtain device supported by braces running to the auto frame. The screens, however, recorded large splashes with all of them, and, in addition to failing in this first essential, some of the guards proved altogether too heavy to be practical for common use.

## CONCRETE-MIXING EQUIPMENT ON MOTOR-TRUCK CHASSIS

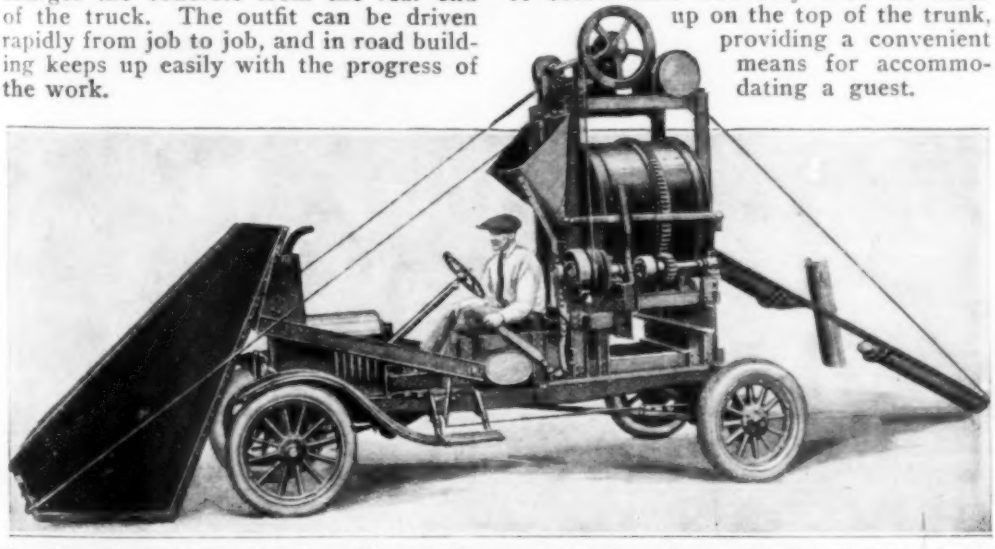
To facilitate road-building work, a complete concrete-mixing outfit has been recently installed upon the chassis of a motor truck. The mixer, which is of one-bag capacity, is driven by the engine of the truck. The charging hopper is pivoted to the front of the truck, and the measured aggregates are conveniently loaded into the hopper when it is resting with one end on the ground. By means of pulleys and cables, it is then swung up to the mouth of the mixer, which discharges the concrete from the rear end of the truck. The outfit can be driven rapidly from job to job, and in road building keeps up easily with the progress of the work.

## MATTRESS CARRIED IN TRUNK UNFOLDS INTO BED

A trunk and a bed have been combined in a large boxlike container, capable of holding a folded mattress and a number of drawers. When traveling, the mattress fits against and keeps the drawers closed. In preparing the combination for a bed, the trunk is placed on its side and the mattress taken from the end, thus giving access to the bedding in the drawers. A comfortable bed may then be made up on the top of the trunk, providing a convenient means for accommodating a guest.



Top: Mattress Removed from, and Placed on Top of, the Trunk, Showing Bedding Drawers. Bottom: Outfit Packed for Traveling



Complete Concrete-Mixing Outfit Installed upon the Chassis of a Motor Truck: The Mixer is Driven by the Engine of the Truck, and is Charged by Swinging Up the Hopper Seen Pivoted in Front of the Truck. The Concrete is Discharged by the Chutes in the Rear

A Modern Lilliput That Has No Lilliputians, Being an Uninhabited Miniature Village Constructed by the Children of a Denver Man near His Summer Home in the Rocky Mountains: The Church Has Spires Three Feet High. To the Right Is an Electrically Lighted Brick Block in the Village

South Pasadena, California, Is Proud of Possessing What Is Doubtless the Youngest Band in the World. Including the Bandmaster, Seen in the Foreground, Each of the 60 Members of the Band Is Seven Years Young or Younger. All Are First and Second-Grade Pupils of the Local Public Schools, Where They were Trained. Left: Close-Up of Three of the Musicians

PHOTOS COPYRIGHT, INTL. NEWSREEL CORP.

Four Spanish Boys, in the Suburbs of Madrid, Using Their Own Peculiar Kind of Scooter to Give Them Greater Speed in a Foot Race: Their Name for This Kiddie-Car Is "Rado"

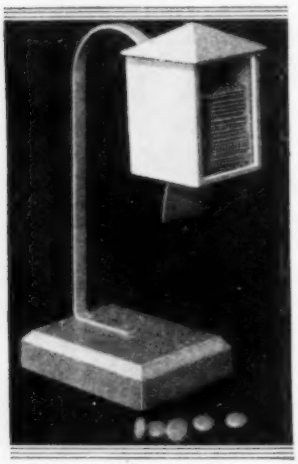
This Stone Football was Awarded as a Trophy to the Friends University of Wichita, Kansas, When the Quaker School Defeated Fairmount College, of the Same Town, by a Score of 26 to 3. It Weighs 500 Pounds, and was Given by the Midian Shrine Temple Circus Committee

Driven by Forest Fires from the Shore While Fishing for Salmon, This Grizzly Bear had to Swim for His Life. A Boat Put Off from the Other Shore, and This Remarkable Photo was Taken, in Spite of the Grizzly's Efforts to Avoid It

Theft Insurance is Not Needed by the Owner of This Car, in London, England. He Considers It Perfectly Theft-Proof When Guarded in This Manner by the Watchful Cheetah, the Hunting Leopard of India, as Fierce as He Is Wary

## SOAP IN FORM OF SHEETS FOR INDIVIDUAL WASH

Intended for office buildings, shops, and public places generally, a new "sheet soap" is dispensed from cabinets in somewhat the same manner as paper towels. The sheets are about 2 by 3 inches, and may be folded or rolled repeatedly, without tearing. It is claimed, in addition, that the sheets will not attract insects, and may be printed for advertising purposes. Another form of soap is like a tablet and can be crushed open, permitting the user to spread it as a paste over his hands.



## GORILLA SANCTUARY PLANNED FOR BELGIAN CONGO

A great jungle sanctuary for gorillas is to be mapped out in the Lake Tanganyika region of the Congo by an American scientist, working for the Belgian government. Here the huge beasts are to be left entirely unmolested. It is probable that only zoölogists and others with a special permit from the government will be allowed to visit the region.

## SYNTHETIC THYMOL CHEAPER THAN IMPORTED DRUG

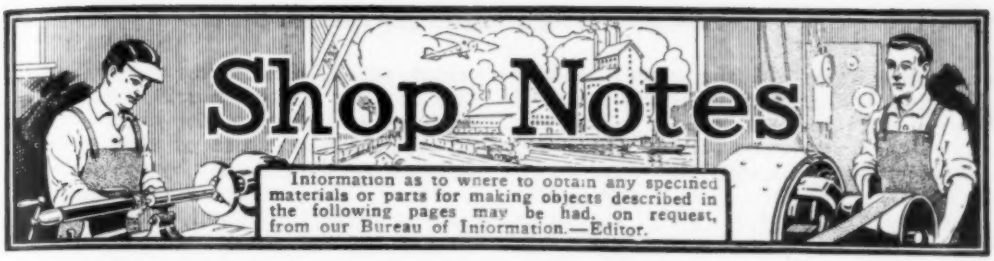
Synthetic thymol, which is a drug used extensively as an antiseptic and in the treatment of the hookworm disease, is being made by chemists in this country, from a waste product of the paper industry. It is said to cost only about one-half as much as the drug imported from India, where it is obtained from a plant.

¶In addition to being fined, traffic violators of Sioux City, Ia., are required to spend two hours in a special class in which they are made to study and recite a long list of traffic rules.

## STATION TRUCK ADAPTS ITSELF TO PLATFORM

An improved truck used for hauling baggage and express around the platforms of railroad stations, has for its main feature a provision for raising and lowering the truck floor through a range of 18 inches. This permits loading and unloading of heavy and bulky articles from points at different heights above the railroad platform. A crank, easily operated by one man, turns a worm and gear attached to a drum, from which cables connect to levers that bear against the four corners of the truck platform, thus effecting the raising or lowering.

Above: New Station Truck Raised to Height of Floor in Baggage Car. Right: Man in the Act of Elevating the Truck Floor, Which can be Raised and Lowered through a Range of 18 Inches


Shop Notes
Information as to where to obtain any specified materials or parts for making objects described in the following pages may be had, on request, from our Bureau of Information.—Editor.

# Cheap Cistern Made of Vitrified Clay Pipe

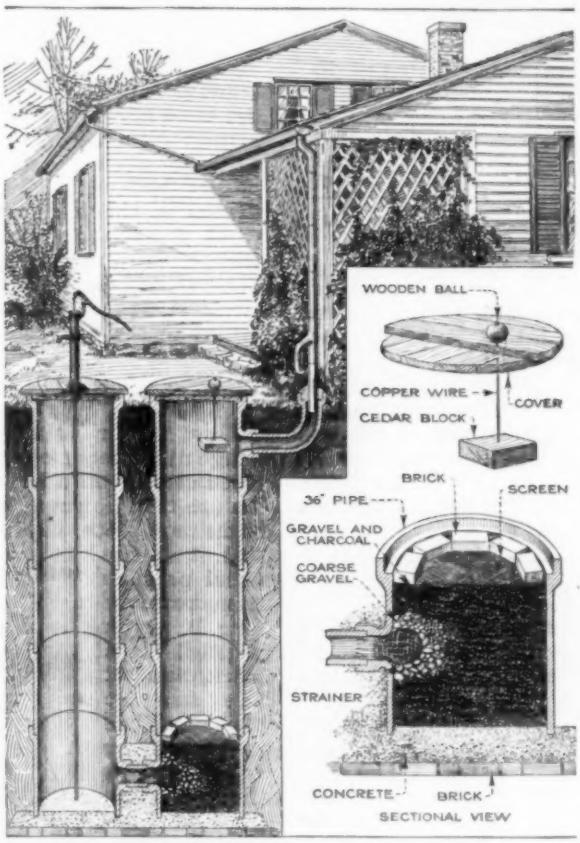
By LOUIS DAVIS

A SANITARY, substantial, and economical cistern can be constructed of 36-in. vitrified clay pipe, in the manner indicated in the drawing.

After the excavation is completed, a substantial base is made by laying a brick floor on the bottom and pouring a 6-in. layer of concrete over this. While the concrete is still soft, two units of 36-in. vitrified clay pipe, each with side outlet, are set into it and connected as shown. The connection is also covered with concrete to prevent any possible leakage. After the base has hardened, the other units of pipe are placed in position and cemented at the joints.

A filter is made by filling the lowest unit of one section with a mixture of fine and coarse gravel and charcoal. A wire strainer is inserted in the side outlet, and some coarse gravel and stones are placed around it, to hold it in position and to prevent the fine gravel and particles of charcoal from passing into the other section. The filter unit is covered with a circular piece of galvanized screen wire, held in place by bricks, as shown in the drawing.

The covers are made of 2-in. boards, nailed together to make a double thickness. A pump is fastened on the cover of the section containing the filtered water, and is fitted with a galvanized pipe extending to within an inch or two of the bottom.




**A Two-Section Farm Rain-Water Cistern Constructed of 36-Inch Vitrified Clay Pipe: It Is More Sanitary than Most Cisterns**

A float gauge is attached to the other cover; this consists of a cedar ball and block connected by a length of No. 10 copper wire. The wire passes through a hole in the cover. When the water reaches the wooden block, it causes it to float and pushes up the ball, indicating that the well is full. A shut-off should, of course, be fitted in the downspout leading to the cistern, so that, when the latter is full, the water can be diverted to a drain.

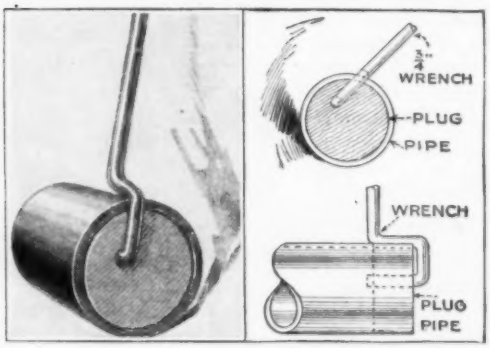
A well of greater capacity can be made by adding sections, excavating deeper than is shown in the drawing.

This type of cistern is very sanitary, as it is immune from soil and rodent contamination, and there can be no seepage.

Furthermore, as the usual walling, bricking, and cement plastering are eliminated, considerable expense is avoided. A two-section cistern of this type can be built for approximately $100 and is virtually indestructible; it will not cave in, cannot be penetrated by tree roots, and is not affected by moisture.

### Wrench for Turning Large Pipe

The wrench shown in the illustration can be made in a very short time, and is



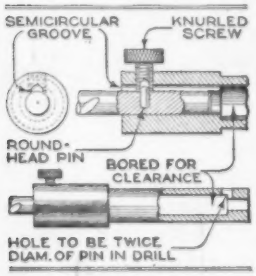

A Simple Wrench, Consisting of a Lever and a Wooden Disk, Makes a Good Substitute for a Large-Size Pipe Wrench

of great value when one is confronted with a job requiring the use of a large pipe wrench, a tool that is usually not carried in the mechanic's tool box.

It consists of a lever made of ¾-in. bar stock, bent to the shape indicated, and a wooden disk that fits loosely in the end of the pipe and has a hole drilled through it, off center, to fit the end of the lever. The manner of using the tool is obvious from the illustration.

### Drilling True Holes in Turret Lathe

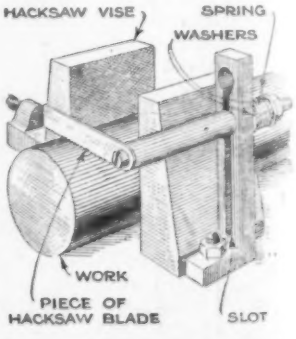
The drill holder shown in the drawing will be found a very convenient means of drilling a hole true in the turret lathe.




Any attempt at drilling a deep hole with a long drill, without previous preparation, will nearly always end in a "drunken" or untrue hole. A twist drill has a certain amount of spring, and if the hole is started slightly out of true, the error will increase with the depth of the hole. A short, stubby drill makes an ideal centering tool for starting a drill, but since the number of holes in the turret will not always allow the use of this, the same effect has been obtained by the use of this holder. The shank of the holder is turned to fit the turret, and left a little larger on the front end; a circle, the same diameter as that of the drill to be used, is scribed on the nose of the tool, and a punch mark made on the circumference of the circle. A hole, about ¼ in. in diameter, is then drilled, parallel with the axis of the holder, from this mark; thus, when the holder is bored for the drill, a semicircular groove is left along the top of the hole. A ¼-in. round-headed pin is driven into a hole drilled in the shank of the drill; this slides in the groove just mentioned. Near the rear of the holder, a hole, about twice the diameter of the pin in the drill, is drilled. The holder is then tapped for a knurled screw. This screw has a hole, the same size as the pin in the drill, drilled a short distance into the point. When in use, the screw is loosened and the drill pushed back until the pin enters the hole drilled in the back of the holder. The work is then centered and drilled part way; then the drill is pulled out until the pin touches the knurled screw, when the latter is tightened onto it and the work drilled to the proper depth.

### Setting Work in Power Hacksaw

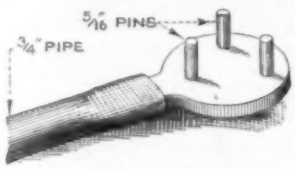
Most power hacksaws have a length-gauge attachment of some sort to be used when cutting off a large number of pieces. To use this, however, when cutting off an occasional piece, requires too much time, and it is the usual practice to measure off the length wanted, file a mark, and set the saw to this. This method also takes time, as the saw frame must be lowered and lifted, and the piece adjusted in the vise, until the mark lines up with the saw. The drawing shows a simple fixture that is designed to be attached to the fixed jaw of the vise, so that the operator can set up a piece very quickly. The body of the fixture is screwed to the vise and has



its upright part slotted, a hole about twice the width of the slot being drilled at the top. Next, a piece of cold-rolled steel is grooved so that the smaller diameter will fit into the slot, and the larger diameter easily into the hole at the top of the slot. This horizontal piece holds a piece of saw blade at one end and is threaded on its opposite end for a nut, which bears against a spring and washer. The fixture should be attached to the vise in a position that will bring the piece of saw blade into the exact position of the saw blade in the frame of the machine. After the work has been set, the horizontal arm is pulled up until it enters the hole, in which position it can be pushed out of the way.

### Valve Wrench for Oxygen Tanks

Opening the valves of oxygen tanks, usually a more or less difficult job by hand, can be done very easily by means of the wrench shown in the illustration. It is made by cutting out a piece of ⅛ or 3/16-in. boiler plate with a cutting torch, to the shape shown, and then brazing or welding the shank or tang in a 6-in. length of ¾-in pipe, flattened to fit the tang. Three 5/16-in. pins, 1 in. long, are welded to the face of the tool so that they will fit in the notches of the handwheel.—A. S. Jamieson, Springfield, Mass.




### Making Rigid Crates

No method of joining the corner members of a crate is alone sufficient to give rigidity to a crate. Some kind of bracing across the faces is necessary.

Figure 1 shows a kind of bracing found in many crates sent to the U. S. Forest Products Laboratory for testing. Although this construction appears to be very strong, partly because of the amount of material used, it has been demonstrated by actual tests that crates so made are very weak when a diagonal strain is applied, and are therefore apt to "weave" and "skew" during transportation. Fig. 2 shows a crate with diagonal braces on six sides. This kind of bracing gives maximum strength for a minimum amount of lumber used. It has been found that crates so braced can withstand, with much less distortion, a diagonal strain twice as great as that applied to crates braced as shown in Fig. 1. Fig. 3 shows a combination of cross bracing and diagonal bracing that is recommended for use with products that need protection on the sides, and that are rigid enough in themselves to withstand stresses in the direction in which the crate is weak.

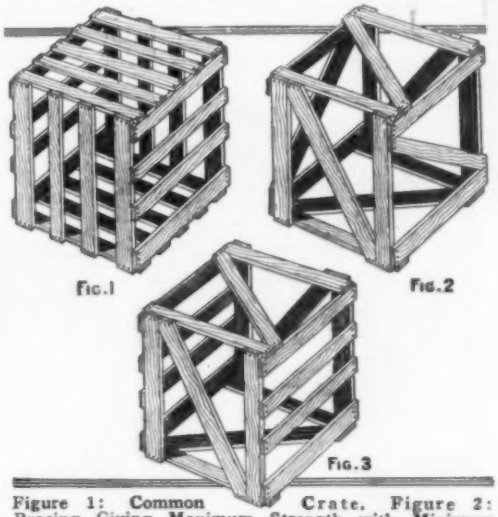
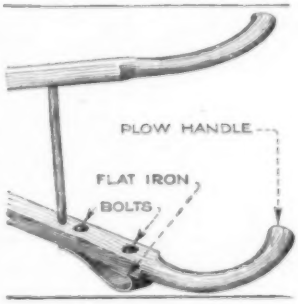



Figure 1: Common Crate. Figure 2: Bracing Giving Maximum Strength with Minimum Lumber. Figure 3: Type Recommended for Rigid Material

Solid sheathing on all faces does not make a crate so rigid as diagonal bracing, except, perhaps, sheathing made of wide boards, with tighter joints than usually obtained. The crate with common sheathing might withstand as great a load, but the distortion caused by that load would be greater than in a crate with diagonal braces, and would, ordinarily, be great enough to cause damage to the contents.

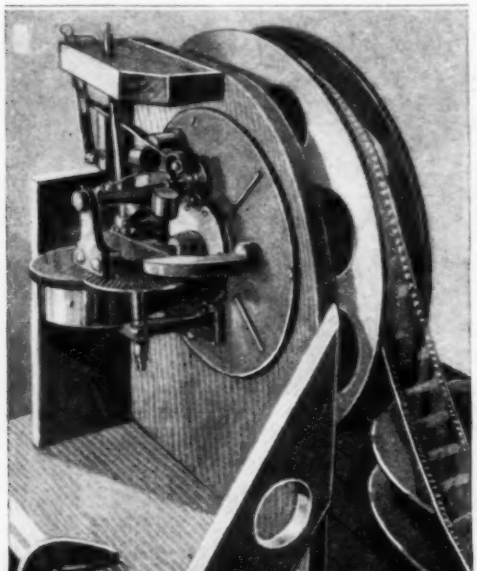
### Protector for Plow Handles

A flat-iron guard, bent and attached on the outside of a plow handle as shown in the illustration, protects the handle from being broken or splintered while dragging the plow on its side over the ground, the customary way of moving a plow for short distances.—J. Howard Hughes, Henriette, Tex.



### Rewinding Machine for Motion-Picture Films

A spring motor, taken from an old phonograph, has been used for several years in the laboratory of a western photographer for rewinding motion-picture films.



Left: Rear View of Film-Rewinding Machine, Showing How the Phonograph Motor is Attached. Right: Front View, Showing Reel in Place

The phonograph motor is mounted upon a wooden angle plate, as shown in the photograph, so that its shaft extends horizontally through the plate; this shaft is provided with an extension to hold the film reel. It is necessary to provide a dog on the shaft, with the tail fitting in one of the holes of the film reel for the purpose of driving it. The brake on the phonograph motor enables the operator to start or stop at will, to run slowly while examining the film, or fast while taking it up.—F. J. Hiscock, Cody, Wyo.

### Drilling Out Broken Cylinder-Head Screws

A frequent job in the garage is that of drilling out broken cylinder-head screws. To do this, without the danger of spoiling the threads of the hole in the cylinder block, the drill should be guided by a bushing, fitted into the hole in the cylinder head. The bushing should fit snugly, so that light tapping is necessary to remove it. Its length should be equal to the depth of the hole in which it fits, and its inside diameter should be the same as the root diameter of the threaded end of the capscrew; this can be determined by consulting a table of tap and drill sizes.

The broken screw is chipped off flush with the surface of the cylinder block. The cylinder head is then put in place, and held by two or three screws. After the broken screw has been drilled out, the cylinder head is removed, and the hole is tapped to its original size, to clear it from the remainder of the screw. Care must be taken to back out the tap frequently to clean out the broken pieces. The bushing should be hardened to prevent it from wearing quickly. It can then be used indefinitely.—Fred H. Wadden, New Glasgow, Can.

### Submerged and Exposed Concrete

Concrete laid under water will set much better than concrete laid in air. This is due to the fact that a far better hydration of the lime results in submerged work than in ordinary work, where the concrete dries out quickly. Work that is exposed to air, such as walks and driveways, should be kept covered for several days with old wet carpet or canvas, or even with moist earth, to prevent it from drying out too quickly.

### Demagnetizing Watches

When a watch is brought within the magnetic field of a powerful generator or magnet, it frequently occurs that the hairspring becomes magnetized, and renders the watch useless.

To demagnetize it, pass a shoestring, or a similar cord, through the bow of the watch and bring the ends together. Suspend the watch by holding the doubled shoestring in one hand, and twist the string tightly by turning the watch with the other hand. Then place the watch close to the field magnets of the generator, or to the magnet, and allow the string to unwind, which will cause the watch to revolve. While the watch is revolving, gradually draw it away from the generator or magnet, so that when it stops revolving, it will be out of the magnetic field. The watch will thus be completely demagnetized. The explanation of this is that the revolving movement of an object in a magnetic field prevents its molecules from assuming any definite arrangement or relation to each other, as they do when the object is at rest in a magnetic field.

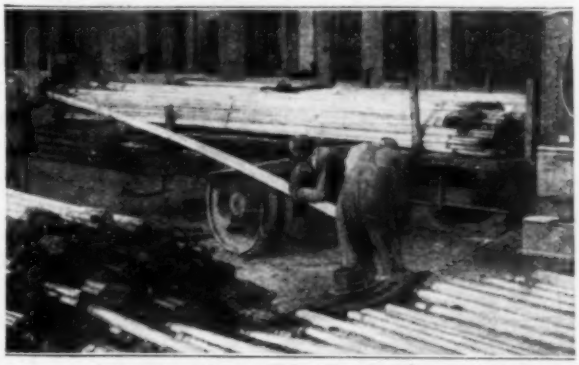
If one has no access to a strong magnet or generator, a magnetic field can be created by forming a hollow coil, 3 to 4 in. in diameter, of about 200 turns of No. 16 insulated copper wire. Connect a flatiron or incandescent lamp in series with the coil and pass the house current through the circuit, which will set up a strong magnetic field inside of and around the coil. Hold the watch suspended on a twisted shoestring inside of the coil and gradually draw it out, while it is revolving.—R. R. Spencer, Denver, Colo.

### Enlarging Holes in Wood

To enlarge a hole with an ordinary wood bit, fit a wooden plug, about 1 in. long, with its grain running lengthwise, into the hole. Drill a small hole in the center of the plug to admit the screw end of the bit. Then drill as usual, as if the wood were solid. When the cutting edge of the bit strikes the plug, it will not cut it easily, as the grain runs lengthwise, and, as the plug does not fit tightly, it will be pushed through the hole, guiding the bit. The plug may be greased if the work permits, and can be used repeatedly for holes of the same size.—Adolph Rieter, Marinette, Wis.

### Loading Pipe onto Trucks

By using the simple method shown in the photograph for loading pipe onto a truck, the work is accomplished in less than one-half the time otherwise required.



A Method of Loading Pipe onto a Truck That Enables the Work to be Accomplished in One-Half the Time Otherwise Required

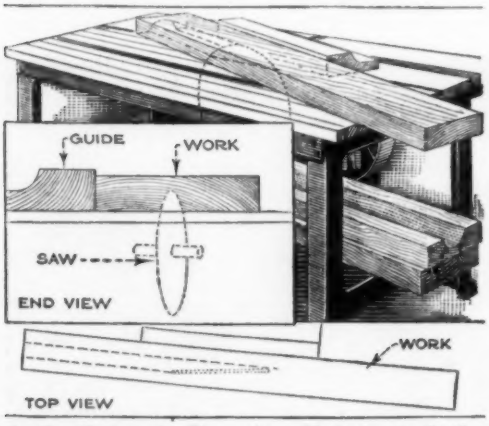
A 6 by 6-in. beam is carried crosswise under the truck in specially made U-irons. When the truck is to be loaded, this beam is pulled out so as to project a few feet beyond the side. Then, by lifting one end of the pipe so that the center is rested on the beam, it is an easy matter to swing first one and then the other end onto the truck.

### A Powder-Loading Tool

When tamping powder into a hole for blasting a large tree, or similar purposes, trouble is usually experienced in pressing the powder down firmly without damaging the fuse. To overcome this difficulty, a tool like that illustrated can be used. It is made from a long bolt, a ring of flat stock being welded around the end to form a boss the size of the hole. A groove is cut in this, as shown, so that the fuse will slide in this groove without being damaged, while the powder is being tamped.

## Cutting Grooves on a Power Saw

The illustration shows how grooves of varying width and depth can be cut very




A Practical and Timesaving Method of Cutting Grooves of Varying Depth and Width in Wood, with a Power Saw

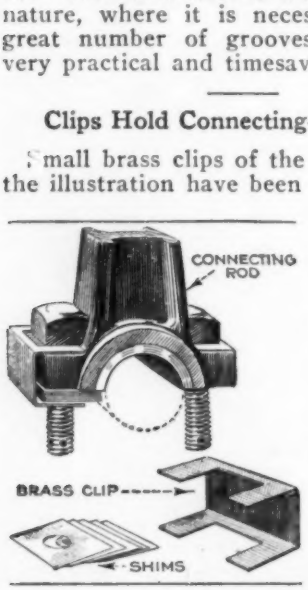
quickly on a circular saw with a wooden table.

A wooden strip is tacked at an angle across the table; this angle determines the width of the groove. Tilting the table up and down determines the depth of the groove, and the work is pressed along the edge of the guide strip as usual.

A woodworker who specializes in dentists' tool cabinets and work of a similar nature, where it is necessary to cut a great number of grooves, finds this a very practical and timesaving method.

## Clips Hold Connecting-Rod Shims

Small brass clips of the kind shown in the illustration have been found to be of considerable assistance for holding connecting-rod shims in place while replacing the caps. The shims on one bolt are held in place with a clip while other shims are being put on the opposite bolt, and these are also held by a clip while the cap is put in place and the nuts are turned on. The clips are pulled off just before the cap is tightened.

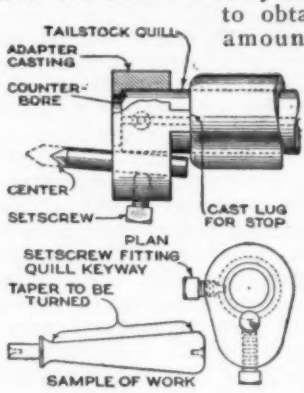



## Simple Blower for Sawdust

After experiencing considerable trouble owing to accumulation of sawdust in a sawmill, the following scheme was devised to blow the sawdust away: The sawdust was led into a 15-ft. wooden pipe, and steam pressure was applied behind the sawdust to blow it through. The wooden pipe was made from four 1 by 4-in. boards nailed together. A ½-in. steam pipe was led to a point opposite the center of the end of the pipe, and about 3 in. away from it. The steam blast picked up the sawdust, forced it through the pipe and blew it to a point 40 ft. from the farther end.—E. C. Smith, Barney, Ga.

## Tailstock Adapter for Standard Tapers

When there is frequent need of turning tapered work in the lathe, to standard or identical tapers, it is difficult to set over the tailstock every time, and always to obtain the correct amount of setover. The drawing shows an adapter that clamps to the end of the tailstock quill and carries an offset center, permanently set for turning a certain taper, such as that of the machine handle shown. The adapter body, of cast iron, is counterbored to a push fit over the quill, and the counterbore assures that it is set in the same position each time. A cast lug, bearing against the end of the tailstock, fixes the longitudinal position of the adapter, while it is prevented from rotating, as well as set for its angular position, by means of a setscrew, the end of which is turned down to fit into the quill keyway.

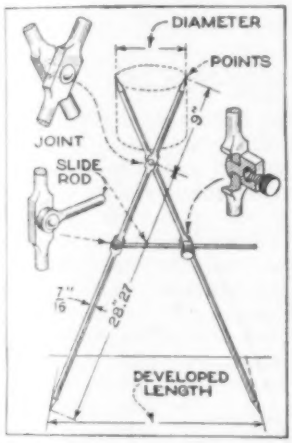



The offset dead center is made of drill rod, with the point hardened and tempered. It is set into the adapter body at an angle, so that it will line up with the center line of the work. This angular setting allows a slight adjustment of the amount of taper, by moving the center in or out and then clamping it in place by means of the heavy setscrew provided for the purpose.

For work having a very slight taper, the construction of the adapter body must be modified by extending it beyond the end of the quill, to allow room for the insertion of the dead center without interfering with the quill.—H. H. Parker, Oakland, Calif.

### Tool Marks Circumference by Measuring Diameter

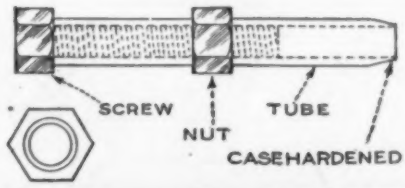
The tool illustrated is valuable to the sheet-metal worker, as it shows the circumference of a circle at once, by measuring its diameter, thus effecting a considerable saving in time, in making cylinders, and the like, and eliminating calculation.

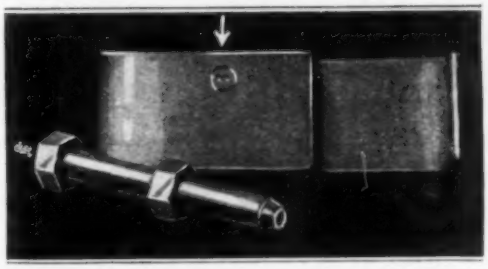



The construction of the tool is simple. It consists of two lengths of 7/16-in. iron rod, flattened at the joint and drilled for a snug-fitting rivet. The center of the joint is exactly 9 in. from one end and 28.27 in. from the other, which is the ratio of the diameter of a circle to its circumference. A slide rod, riveted to one leg, below the joint, so as to move freely, but without shake, and passing through a swivel on the other leg, locks the tool at any desired measurement. Measurements may be taken from a full-size drawing or from metal parts already made. While the dimensions given in the drawing cover a tool suitable for average work, it can be made as large or as small as desired, providing the proper ratio of leg lengths from joint to ends is maintained.

### Marking Dismantled Machines

When dismantling machines for repair, it is always wise to place an identifying mark on various parts before removing them, so as to avoid mistakes in replacing them and to save time in reassembling. It is often difficult to distinguish the correct marks from other similar marks that have been made either accidentally during use, or purposely during previous repairs. A method that makes it easy to distinguish the correct marks is to punch a circle around them



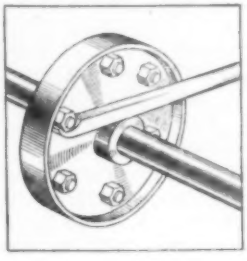
A Steel Die Stamp That Punches a Circle around Identifying Marks on Parts of Machinery Dismantled for Repair

with a steel die stamp of the kind shown in the illustration.

This stamp consists of two short pieces of steel tubing, a capscrew, and a nut. One piece of tubing is ground on the end to a cutting edge and this end is casehardened. The other end of this piece and the entire length of the other piece of tubing are tapped so that the capscrew can be screwed in to hold both pieces together. The nut is run onto the screw between the tubes. This makes the tool solid so that it will sustain the tapping of a hammer. The nut in the center makes it easier to press the cutting edge squarely on the work, and the hexagonal shape of the screw head and nut prevents the tool from rolling when laid down.—Harry Moore, Montreal, Can.

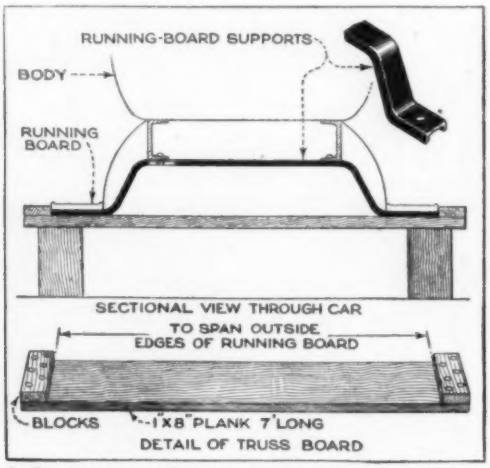
### Turning Heavy Shafts

The method shown in the illustration makes it easy to turn a heavy shaft around. By placing the end of a crowbar under one of the nuts on a coupling and using the hub of the coupling as a fulcrum, sufficient leverage is obtained to turn the shaft around.



### Board Supports Auto Body

The malleable castings, trussed by two rods that extend crosswise under the chassis, that support the running boards




**A Plank Support Prevents Running Boards and Dust Shields from being Bent by the Blocking Used during Repairs**

of a light car, have been dispensed with on the latest models, and two supports, made of channel iron, bent to the shape indicated in the drawing, have been substituted for them. This change of construction necessitates a change in the method of supporting the body while removing the rear end for repair.

If the usual method is employed, of blocking under the running boards, the latter, and the dust shields, are bent and otherwise damaged. To prevent this, a strong plank with blocks of wood securely attached to the ends, as indicated, has been found very satisfactory. The blocks fit on the outer edges of the running boards as shown, and prevent them from spreading apart when the car is jacked up and blocks placed under the plank.

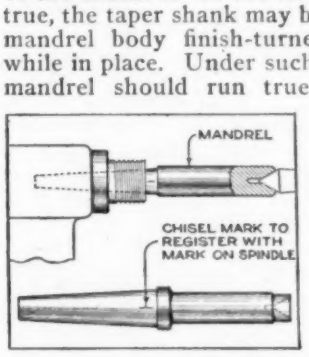
### Emergency Index Plate

In the course of experimental work on a spring motor, it was found necessary to use a 24-pitch pinion having 11 teeth. As no index plate for this size of pinion was available, the following method was used to make the pinion:

The index plate was removed from the miller and shellacked to the center of a smooth piece of wrapping paper, 3 ft. square. A circle of 3-ft. diameter was drawn on the paper, concentric with the circumference of the index plate. With the dividers, the circumference of the 3-ft. circle was divided into 11 equal parts, and radii drawn with a sharp-pointed pencil to the center; this was, of course, done as accurately as possible. The paper was then trimmed off to the size of the index plate, after which the latter was replaced in the miller. A surface gauge was clamped to the machine so that its scriber touched one of the radii, near the circumference. The locating finger of the head, which was adjustable, was set in place in one of the notches. After a cut had been made in the pinion blank, the index plate was set with the scriber at the next radius line in the same way as before, the finger moved into another notch and fastened, and a second cut made. In this way all 11 teeth were cut.—Dexter W. Allis, Whitman, Mass.

### A Lathe Center-Hole Mandrel

For light turning in the lathe, a mandrel with a taper shank, fitting into the live-center hole, is a useful attachment, as no faceplate and dog are then needed, and the cutting tool can work up close to the end of the mandrel. If the live-center hole is true, the taper shank may be fitted and the mandrel body finish-turned and ground while in place. Under such conditions the mandrel should run true whenever replaced, but in any event, the best way is to scribe a line or make a chisel mark on the shank in line with a corresponding mark on the face of the nose. In replacing the mandrel, the two marks are made to register, and the mandrel should then run true, even if the hole is slightly "out."




Several mandrels of different lengths and diameters, to suit the work at hand, may be made; they should be center-drilled for the tailstock center, though short pieces could be finish-turned, by taking light cuts at fairly high speed, without the use of the tailstock-center support. The mandrel body is preferably hardened and ground in place, but the temper of the shank should be drawn until soft enough to scrape; then Prussian blue is used for testing the fit in the center hole, and the shank is scraped until it fits accurately all over. It will hold tightly enough for all ordinary work.

### Circular Yard Saves Brooder Chicks

In my first years of experience in raising brooder chicks I used an inclosed "yard," 10 ft. sq., that could be moved about to give the chicks a space of fresh grass occasionally. While watching the chicks one day, I noticed that several of them, that appeared to be suffering from the cold wind, would run along one side of the inclosure until they came to a corner, where they remained, huddled together as if they could go no farther. I picked them up, placed them in the brooder, and returned to watch the yard again. As soon as the cool breeze again swept over the yard, another dozen or more huddled together in one corner.

Satisfied that the corners were to blame, I placed all the chicks in the brooder, and rebuilt the yard in the form of a circle. The chicks were then released into this yard, and, when desirous of returning to the warmth of the brooder, simply followed the fence until they came to the open door. The result was that the loss of chicks due to chilling was greatly reduced.—G. E. Hendrickson, Argyle, Wis.

### A Handy Auto-Cleaning Tool

A stiff scrubbing brush, such as commonly used about the house, with a piece of stiff sheet metal fastened to one end to serve as a scraper, makes a very convenient tool for cleaning the inaccessible parts of an automobile chassis. By mounting the brush on the end of a handle, as indicated in the drawing, almost any part of the machine, even the oil pan, can easily be freed of mud and dirt without the necessity of crawling underneath the car. The scraper will be found particularly convenient for removing accumulations of road tar, and dislodging clods of mud on the brake mechanism and frame, the brush being then used to clean the scraped surface.

### Farm Tractor Used as Snowplow

Following a snowstorm that blockaded traffic in a Kansas town, a farm tractor was used to clear the streets. The blade of a road-grading machine was attached at an angle under the frame, as shown. A roadway, 20 feet wide, was cleared in two trips, the snow being pushed to both sides of the road. The work was accomplished by one man at the rate of three miles per hour.

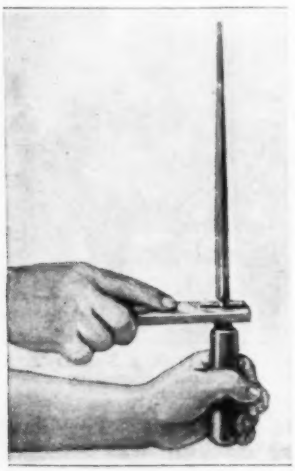
**A Tractor Used to Clear the Snow from the Streets in a Kansas Town after a Heavy Snowstorm: The Work was Accomplished by One Man at the Rate of Three Miles per Hour**

### Wagon-Wheel Rim Puller

During dry weather, wagon-wheel rims have a tendency to slip to one side or the other of the fellies, owing to the shrinking of the wood. Where this occurs, it is necessary to force them back into place, a job usually done with a heavy hammer. A better tool for the purpose, made from a ¾-in. iron or steel rod, is shown in the illustration. A 5-in. length of the same material is welded to the rod, near one end, and both arms are forged as shown. In use, the hooked arm is caught on the side of the rim, and the longer arm pressed against the felly.

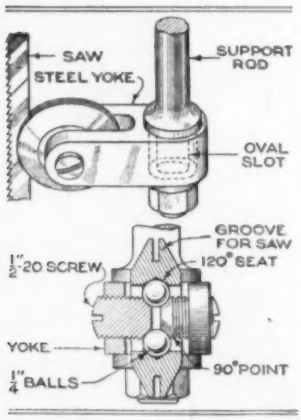
### Tool for Removing Handles from Files

In shops where a box of files is carried around from one job to another, each one is not fitted with a handle, because of the space that this would require. Two or three handles are used, and these are usually knocked off and then fitted to other files, as required. Using the files themselves to do this, as is commonly done, is very injurious to the teeth, as both faces are scraped together, and furthermore, the files are frequently broken in this way. The photograph shows a simple tool for removing the handles. It is made of flat stock with a tapered slot cut in one end. By holding this tool in one hand, to grip the file, as shown, it is an easy matter to pull the handle off with the other hand.



### Ball-Bearing Guide Roller for the Band Saw

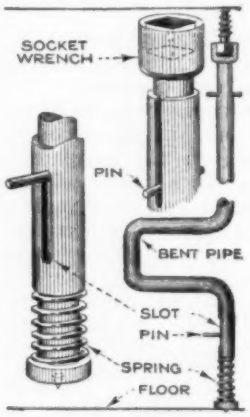
Anyone who has used the band saw as a woodworking tool is familiar with the troubles that result from a loose roller guide. The usual method of making these guides is to mount a hardened roller on a hardened pin, but, after a few months of operation, wear causes the roller to "wobble." This defect, however, is not found in the ball-bearing roller shown, which is practically everlasting, and, besides, is adjustable in three directions.




The roller is made of tool steel, machined with a groove around its circumference. The cold-rolled steel yoke is drilled and tapped for ½-20 screws, the points of which are ground to an included angle of 90°, as shown in the drawing. Quarter-inch steel balls are nested into the raceway with a liberal amount of grease, to make them stick until the roller is assembled. Adjustment for play and proper running fit is obtained by tightening the screws, which should be made of hardened tool steel, and be a tight fit in the yoke. When, after using, looseness develops in the guide roller, the slack can easily be taken up.

### A Brace for Overhead Lagscrews

Much of the difficulty and danger connected with erecting or removing overhead line shafting is eliminated if the lagscrews are loosened or tightened with a brace of the type shown in the illustration.



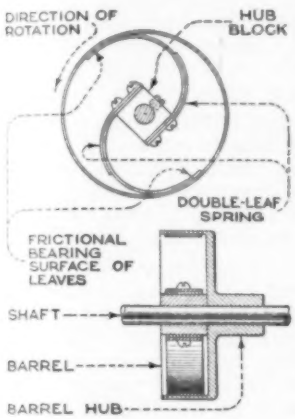

The brace is made of pipe, bent to the shape indicated, and extends from the floor to the ceiling. At the bottom end an extension leg fits loosely inside of the pipe; this leg has a coil spring around it, and a collar and small point are turned at its lower end. A pin, driven into the leg through a slot cut in the pipe, keeps the leg from falling out, and also allows the brace to adjust itself to suit the height of different line shafts. Two slots are cut opposite each other in the top end of the brace, to allow the insertion of a pin-driven socket wrench.—S. A. McDonald, Brooklyn, N. Y.

### Labels Made of Adhesive Plaster

It is often difficult, and sometimes impossible, to stick gummed-paper labels to oily or rough surfaces. In such cases, a strip of adhesive plaster, properly lettered in ink, makes an excellent substitute, as it will stick to almost any surface. Adhesive plaster can also be used satisfactorily to fasten samples to the outside of boxes.—Thos. W. Benson, Philadelphia, Pa.

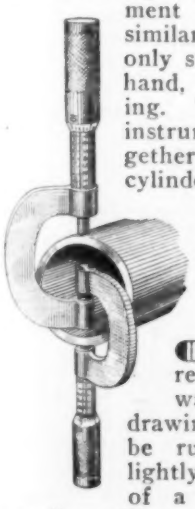
### Friction Clutch Substitute for Ratchet

A friction clutch, of the type illustrated in the drawing, is used in place of a ratchet when it is not advisable, or possible, to use the latter. The clutch consists of two double-leaf springs, fastened to a hub block as indicated. Double-leaf springs are used, as they are stiffer than single-leaf springs and do not add to the friction when working in the reverse direction. There are several advantages gained by using this type of clutch. It is well balanced and therefore does not give a one-sided pull, which wears the shaft and bearings. Another feature is its reversibility; by simply turning the hub block over, the operation of the clutch is reversed.




### Measuring beyond Capacity of Micrometer

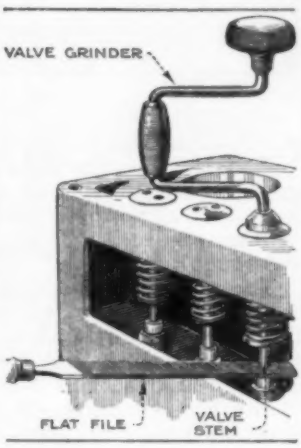
A shop kink that will enable the mechanic to get the micrometer measurement of large bushings and similar cylindrical work when only small micrometers are at hand, is shown in the drawing. The anvils of the two instruments are placed together and inserted inside the cylinder, with the spindles in contact against the outside wall. The correct measurement is the sum of the two readings.



¶Colored crayons are recommended instead of water colors for tinting drawings. The crayon should be rubbed on the drawing lightly and spread by means of a soft brush dipped in gasoline. The color does not readily rub off, although, unless the paper is very porous, it may be erased with a soft rubber.

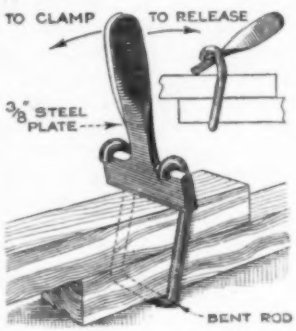
### Shortening Valve Stems

The illustration shows a simple method of shortening valve stems without removing them. Raise the valve high enough to allow the insertion of a flat file under the stem, as shown. The tension of the valve spring will hold the stem solidly against the file teeth. Turn the valve with the valve grinder; this will grind away the end of the stem in contact with the file. Remove the file occasionally and test with a feeler gauge to keep the clearance within the proper limits.




### Simple Clamp Holds Timbers

The illustration shows a serviceable clamp for holding together the ends of timbers of uniform width while putting in bolts or screws, or accomplishing other work that requires the timbers to be held in position firmly. A clamp of this type has been used by a builder for holding 6 by 6-in. beams temporarily while bolting them together. A length of iron rod is bent to a U-shape, as shown, to straddle the beams. Both ends of the rod are turned over to form hooks to fit over the edge of the cam plate. The cam is cut from a piece of steel plate. Raising the handle to a vertical position tightens the clamp, and bringing the handle slightly over the center position locks it. The length and thickness of the iron rod, and also the thickness of the steel plate, depend on the work for which the clamp is to be used.—G. A. Luers, Washington, D. C.



# MAKING GLASS SIGNS BY SANDBLASTING

BY JAMES TATE

COMPARATIVELY few persons, aside from the limited number engaged in the commercial side of the work, are aware of the possibilities latent in the process of decorating glass by means of the sandblast.

The process is a simple one, and with some artistic talent, and the proper facilities for the work, there is no reason why any reader could not build up a good business in this field.

The first necessity, of course, is some form of sandblast machine. These are made commercially in a wide variety of types, but the man starting on a small scale may use any of the homemade forms shown in Figs. 1 to 3 with perfect satisfaction. It is assumed, of course, that a supply of compressed air is available; for experimental work, this may be furnished by a small garage compressor, or even by a more simple apparatus, consisting of a tank capable of withstanding a pressure of about 60 lb. per square inch and a hand air pump.

The pressures used in sandblasting vary from 8 to 60 lb. per square inch; the higher the pressure, within these limits, the better, as, with a high pressure, the sand is projected against the work with greater force and velocity, and the abrasive action of the sand is heightened, thus lessening the time required for the work.

A word about the sand used will be pertinent here; any clean, sharp sand will answer for the purpose, although there are a number of dealers around the country who can supply special sand for the work. Sand of various grades of fineness should be kept in stock, as the texture of the "frosting" on the glass can be varied by their use. For example, with a coarse sand, the surface of the treated portions of the work will be quite rough to close inspection, while, if a very fine sand is used, the surface will be practically smooth. The sand used should be chosen with regard to the character of the work to be done, using very fine sand for such work as monogramming tableware and similar small pieces, and coarser sand for door panels, large signs, and the like. The use of the coarse sand for large work will also speed up the work considerably.

The equipment shown in Fig. 1 is made, for the most part, of pipe and fittings, with a few feet of rubber hose, and a hopper for the sand. The size of the latter, of course, may be varied to suit individual desires, space, or type of work. The sand is fed from the hopper by gravity, and the flow may be controlled by means of a sliding shut-off valve fitted in the bottom of the hopper, or by a butterfly valve in the ¾-in. pipe below it. This control valve has been omitted in the drawing, for the sake of simplicity.

The outfit shown in Fig. 2 has proved to be very practical for this work. The sand tank is made from an old range boiler, which is quite suitable for use with pressures not exceeding 20 lb. per square inch. If higher pressures are employed, it is recommended that a new range boiler be used; these are usually tested to 150 lb. per square inch, and will thus stand pressures up to 60 lb. with an ample margin of safety. Before using an old boiler it would be well to have it tested to about 75 lb., and thereafter use it for not more than 20 lb., using a gauge, as shown, to insure that this pressure will not be exceeded.

Practically all of the piping used is 1½ in., and it will be noted that the tank is not completely filled with sand, an air space being left at the top, and a connection from the air pipe made to this space. This puts the sand under pressure, and insures a steady flow. A cross may be used instead of the tee shown below the tank, and the lower outlet plugged; then, if the sand valve becomes choked, the plug may be unscrewed, and a wire run through the valve, to clear it. The pipe at the nozzle is reduced to ½ in., and a valve must be provided in the line between the sand and air tanks. When filling the tank, the sand should always be run through a fine sieve, to remove foreign matter and small pebbles, as the former might choke the valves or pipes, and the latter break the work, and the tank should not be filled higher than the level shown.

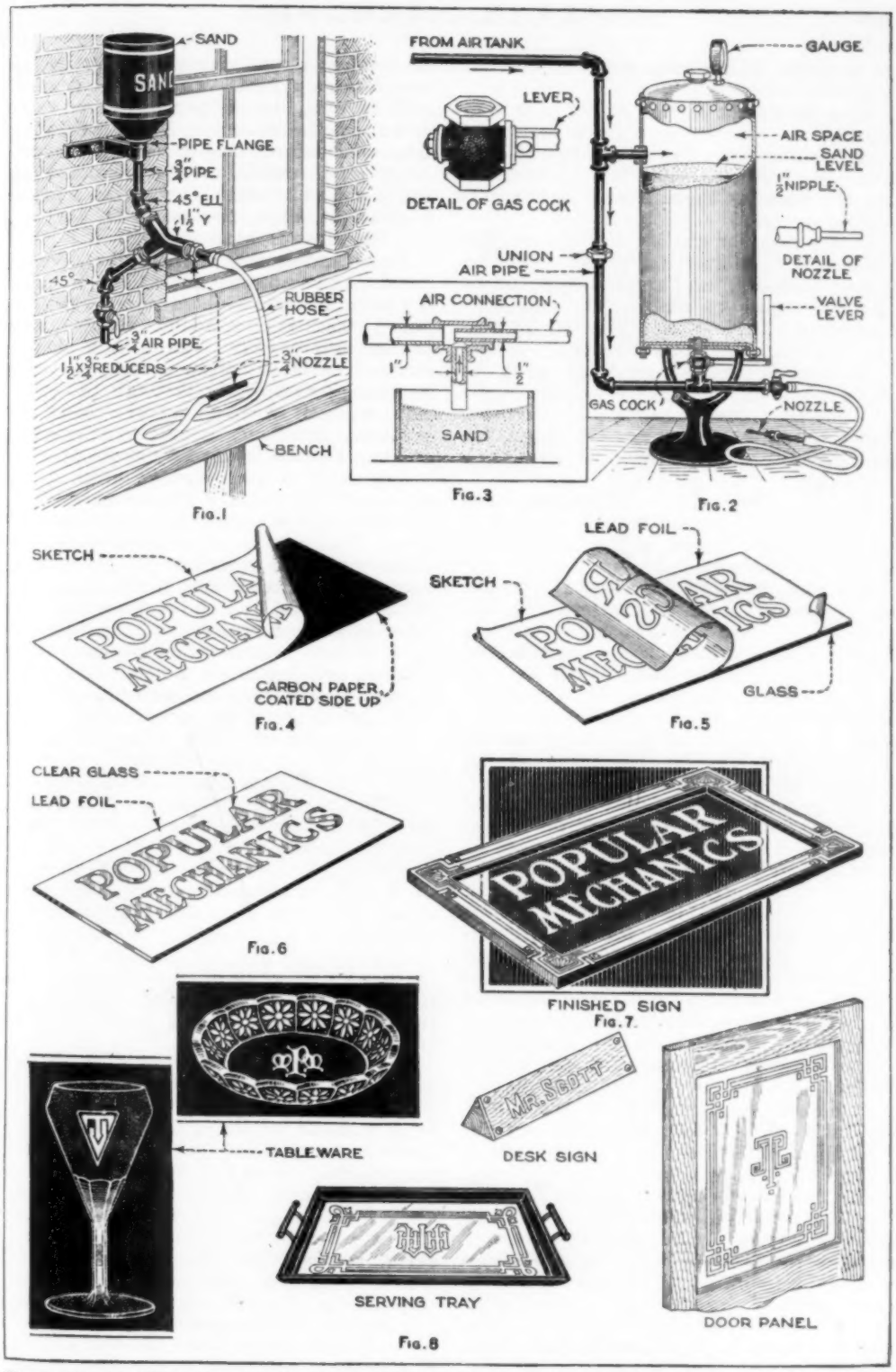



Fig. 1 Fig. 3 Fig. 2

Fig. 4 Fig. 5

Fig. 6 Fig. 7

Fig. 8

Figures 1 to 3: Simple Forms of Homemade Sandblast Machines, Made, for the Most Part, of Pipe and Fittings. Figures 4 to 7: The Various Steps in Making a Glass Sign by the Sandblast Process. Figure 8: A Few Examples Illustrative of the Wide Variety of Decorative Work to Which the Process may be Applied

to prevent sand from choking the air pipe.

The equipment shown in Fig. 3 is very simple, and may be used for a variety of small work. Only the details at the sand box are shown, as the other connections are the same as those shown in the preceding figures.

It is a peculiar quality of the sandblast that soft, yielding materials, such as paper, lead foil, etc., are not attacked or abraded nearly as quickly as hard ones like glass. This makes it possible to protect, by means of masks, the parts of the glass that are not to be acted upon by the sand. The masks are usually made of lead foil; brown paper can be used, but the foil is preferable. A supply of suitable foil can be obtained from any florist.

Figures 4 to 7 show the various steps in the work of making a plain sign; this example, while a simple one, completely illustrates the process.

The glass having been cut to the proper size, a pencil sketch of the lettering, the exact size of the work, is made on good paper. The sketch is laid on a piece of carbon paper, the coated side of the latter being up, as shown in Fig. 4, and the outline of the letters gone over again with a stylus or medium-hard pencil. This leaves a carbon impression of the lettering on the back of the sketch sheet.

The glass is now coated with melted beeswax, a sheet of foil placed on it, and rubbed into close contact with a piece of hard felt, or the rounded edge of a piece of leather belting. The glass should be kept warm while this is being done—by laying it on a radiator, for instance—so that the foil will adhere firmly to the wax. When this is done, the foil is also coated with wax. Both applications of wax may be made with an ordinary paintbrush. The sketch, with the carbon impression down, is laid on the waxed surface of the foil, in the proper position, and rubbed all over with the bottom of the bowl of a spoon, or a like article, then lifted off. This leaves the carbon lettering on the wax surface, as in Fig. 5.

The foil is then cut, along the lines of the lettering, with a mat knife, or photographer's etching knife, and the cut-out portions removed by inserting the point of the knife under the foil. The foil, when stripped, brings with it practically all the wax on the glass, and leaves the sign as shown in Fig. 6, ready for sandblasting.

If the work in hand is a sign that must be "printed" in reverse, the foregoing procedure is varied a little—no carbon paper is employed. The sketch is made with a soft, black pencil, placed, face down, on the waxed foil, and rubbed as described before; this leaves the reversed lettering, in pencil, on the wax, and the foil is cut as before. This makes a rather nice effect, after the work is done, as the lettering is read through the glass.

The sandblasting is simplicity itself, consisting in nothing more than directing the blast of sand and air against the exposed glass. The sandblast is capable of producing any effect from a light surface frosting to a very deep etching, or even to cutting completely through the glass. The method of handling the blast for best results depends upon several factors, and can best be learned by experience.

Any kind of glass can be used in the process, although, for signs and work of a similar character, plate glass is preferable. Particularly pleasing results, for some purposes, especially where a light is used behind the sign, are obtained by using what is known to the trade as "flashed" blue or ruby glass. In this, the color is only on, or rather a part of, the surface, and, when the letters are frosted as described, they stand out white against a sharply contrasting background.

The samples of work shown in Fig. 8 indicate but a few of the many uses to which this process may be put. Glass is not the only material that may be decorated by means of the sandblast; metals and woods may also be treated exactly as described. Wood, being softer than glass or metal, will require more time than either, but very elaborate effects can be produced in it, providing the design is deeply blasted, say, to a depth of about 3/16 in. In all work of this character, the result, of course, will depend almost entirely upon the artistic talent of the worker.

It is essential, in this work, that the eyes, nose, and throat be protected against flying particles of sand. The simplest method of doing this is to wear close-fitting goggles, and tie a moistened handkerchief or sponge over the nose and mouth. Special helmets may be obtained also, with an air hose that is led to a source of pure air. An old army gas mask, which is obtainable from any of the so-called army stores about the country, can be adapted to this purpose and will make a very good helmet.

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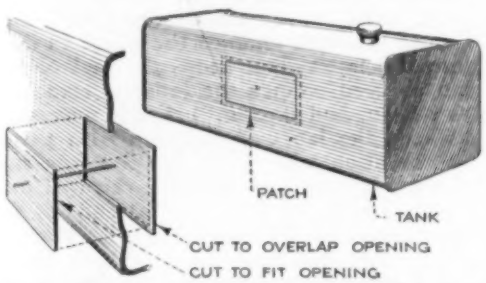
¶ A general principle in fastening members together with wood screws is to hammer them before final tightening.

## An Invisible Tank Repair

An excellent method of repairing punctured gasoline tanks is shown in the illustration. After the repair is finished, it is practically invisible, and very strong.

A rectangular opening is cut at the spot where the puncture occurs, and two metal plates are cut to form a patch for this opening. One plate, which may be of any convenient thickness, is cut slightly larger than the opening, so that it laps about ½ in. over the edges. The other plate is cut to fit exactly in the opening, and its thickness must be the same as the thickness of the tank wall. A wire is soldered at right angles to the center of the larger plate, as shown, so that it can be held firmly against the inside of the opening. The edges of this plate are tinned with solder, and it is then slipped through, and drawn into place. The smaller plate has a hole drilled in its center to fit over the wire and is pushed down into the opening against the inner plate. Solder is applied between the plates along the edges, and a blowtorch is then used to sweat the two plates together. The wire is pulled out after melting the solder that holds it,




An Inconspicuous and Strong Repair for a Punctured Gasoline Tank Made by Sweating Two Plates Together

and the small hole in the outer plate is filled with solder.

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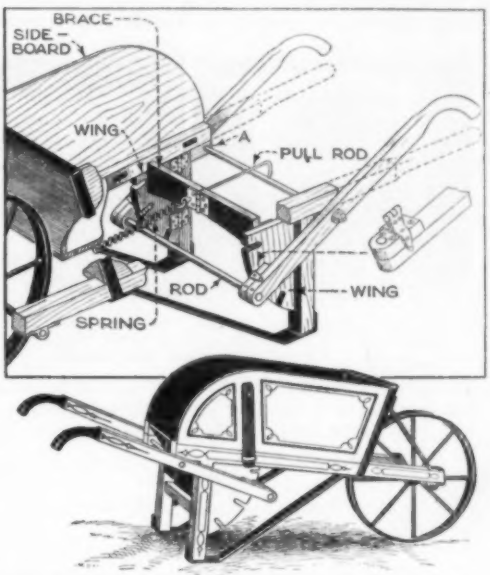
## Adjustable Wheelbarrow Handles

The difficulty of handling a wheelbarrow with a heavy load is eliminated by providing it with a set of adjustable handles. This enables the body to be lowered, to suit a high load, or, in other words, to lower the center of gravity. Although wheelbarrows differ in size and design, they can all be reconstructed along the lines shown in the drawing.

The original handles are cut off where the sideboards end. Two plow handles, straight style, are swung on a pivot rod fastened just underneath this point. This rod is run through small wooden blocks, A, fastened on each side of the body with

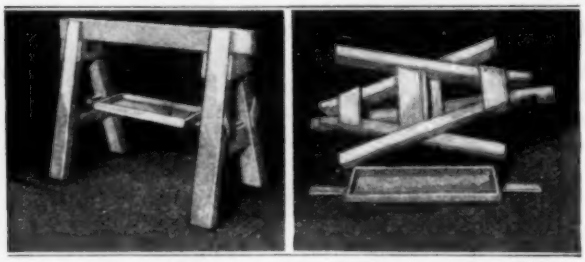



Wheelbarrow Handles That can be Raised or Lowered and Locked as Desired, Make It Easy to Handle Heavy Loads

3-in. wood screws. A quadrant-shaped wing is hinged on each leg to swing toward the inside; these are 1 in. thick, and 6 in. wide at the top. The curvature of the wings depends on the radius of the handle and can be marked off accurately, before sawing, by holding a pencil in the proper position, near the lower end of the handle, while moving it. Three or more slots are cut in the curved side of each wing in a radial line with the pivot on which the handle moves. Hinges, bent and mounted on blocks at the end of the handles as shown, fit into the slots in the wings. A wooden rod runs through the lower end of both handles. A two-piece brace is hinged to the inside of the wings in the position indicated. The two parts of this brace are connected by a hinge, which holds them together firmly, yet allows them to be pulled outward by means of the pull rod that is attached to the front side of one piece. When the pull rod is released, both pieces are instantly brought back into their end-to-end position by a coil spring, connected to the brace and to the underside of the wheelbarrow. To change the pitch of the handles, they are unlocked by pulling the pull rod; then, after moving the bent hinges to another slot, the handles are locked by releasing the pull rod.—R. B. Cutler, Springfield, Vt.

### A Folding Horse

The photograph shows a folding horse that has been found to be of great convenience around the shop or garage. The tray, attached to the lower cross rail, is used to hold tools and materials such as screws and nails; it is an added convenience, but can be omitted if desired.

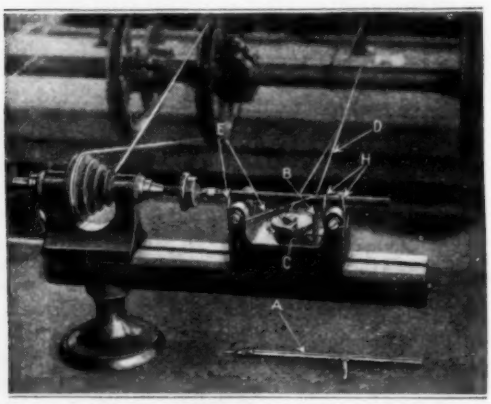


A Folding Horse, Consisting of Four Members, That Takes Little Space When Folded, and Proves Very Convenient around the Shop and Garage

The upper cross rail is fastened to the legs with hinges, so that the three members can be folded compactly, as shown. The hinges are attached to the underside of the rail, and to the braces nailed to the upper end of the legs, on the inside. The corresponding braces on the outside fit under the extending ends of the cross rail when the horse is set up, to prevent the legs from swinging out at more than 90° from the rail. The lower rail fits between the legs in notches cut for this purpose. When folded, this horse takes up very little space and may be carried from job to job in an automobile.—Donald W. Clark, Buffalo, N. Y.

### Bench-Lathe Lap Operated with Rubber Bands

A simple but effective method of making an ordinary bench lathe work automatically is shown in the accompanying photograph. In this case the lathe happens to be used for lapping a small hole through a diamond wire-drawing die. The toolholder A moves back and forth while the work revolves. The movement is kept up by means of a cam, C, and rubber band, E. The cam C is driven by a belt, D, and bears against the vertical post B. At every half turn the cam pushes the toolholder away from the work. At the other half turn of the cam, the rubber band E pulls it back toward the work. The band E also holds the toolholder down in the V-pulley in front of the tailstock. A second rubber band, H, keeps the toolholder down in the rear V-pulley.

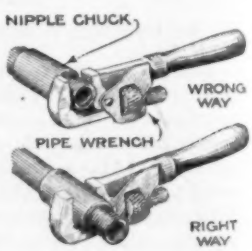



Lapping Diamond Wire-Drawing Dies in a Bench Lathe: The Toolholder is Reciprocated by Means of a Cam and Rubber Bands

A common sewing needle, ground and lapped to the correct size, is used to lap the hole through the diamond. A thin paste, made of diamond dust and oil, is applied to the end of the needle and the hole. The movement of the lap in and out of the hole enables the paste to flow into the latter, and keeps the end of the lap covered. Once the lathe is arranged as shown, and started, it is only necessary to keep the lap well supplied with paste. In the shop where this method was employed, it required only one-third of one man's time, per day, to attend to 20 machines.—E. F. Lake, Detroit, Mich.

### Proper Use of the Nipple Chuck

Many a good mechanic will spoil a perfectly good short nipple, after threading it in the chuck, by trying to unscrew it by means of a pipe wrench gripping the newly cut threads. The nipple, with threads cut on one end, is screwed into the nipple chuck, consisting of a piece of pipe of the same size as the nipple, and about a foot long, with an ordinary pipe sleeve or long coupling screwed on for about two-thirds of its length.

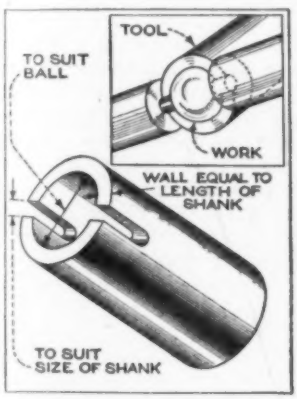



The nipple, having one end threaded,

will bottom against the pipe and prevent it from screwing too far into the sleeve when the die is rotated. All this is common practice; it is the removal of the completely threaded nipple without spoiling the thread that constitutes the trick. Instead of catching the threads with the pipe wrench and crushing them, the wrench is applied to the sleeve and turned far enough to separate the abutting ends of the pipe, where the nipple can easily be unscrewed by hand.—Edwin J. Bachman, Fullerton, Pa.

## A Sphere-Turning Tool

The illustration shows a tool that will finish a ball in one operation, except for cutting off the work on either side of the shank. It consists of a tube made of solid steel. The inside diameter is drilled out to the measurement required. Two slots are cut opposite each other on the end where the drilling is finished, as this end is usually more true to size than the end where the drilling is begun. For greater accuracy, the hole should be ground to size. The width of the slots is equal to the diameter of the shank desired, and the depth about two-thirds greater than the diameter of the sphere to be turned.

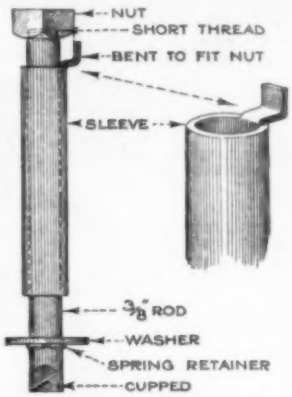



A handle may be made to hold the smaller sizes, as for model work, so that the tool can be held in the hand and steadied on the hand toolrest while pressing it against the stock as it turns. Small balls can be made in one operation. Work of larger size should first be roughed off in the ordinary way, as this is quicker and saves wear on the tool.

A tool of the above description was used for turning one hundred 2½-in. balls, with shanks, that had to be finished accurately to size. In this case the tool was tapered on the inside, from the rear, to give it a better cutting edge. It was held stationary on a V-block in the toolrest of the lathe, the end being held on a dead center also clamped to the toolrest.

## Starting Nuts in Slots

The tool shown in the illustration has proved of considerable assistance in placing washers and starting nuts on bolts located in a hole, or slot, so deep that one cannot get at them with the fingers.




The tool is made of a short length of ⅜-in. steel rod of the same diameter as the bolt threads. A groove is cut around it near one end, to allow a spring-wire ring, or retainer, to be snapped in. This ring is cut so that it can be compressed in the groove, to allow a washer to be slipped over it. When released, the retainer will spread out and prevent the washer from slipping off. The end of the rod, near the retainer, is cupped so that it will fit on the round end of a bolt. The other end of the rod is threaded to the same pitch as the nut to be screwed in place; only a few threads are required. A sleeve, made of steel tubing, and fitting neatly on the rod, is cut and bent to grip the nut.

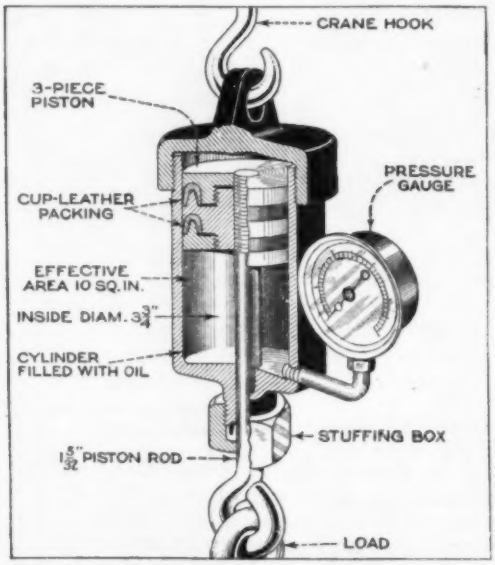
The tool is loaded for use by pushing a washer over the spring retainer, and screwing a nut on the threaded end. Then the cupped end of the tool is rested on the end of the bolt, and the sleeve is pushed down, forcing the washer over the retainer and onto the bolt. The other end of the tool is then placed in the slot, and the nut is screwed on the end of the bolt. While the threaded end of the tool is being unscrewed from the nut, the hook on the sleeve is held against it, to prevent it from being screwed off again.

## Warming the Gas-Engine Lubricator

During cold weather, when oil thickens in the oil cup of a gas engine, preventing proper lubrication, place an old tin can upside down over the oil cup. Punch a hole in the bottom of the can to allow the feed-regulating lever to project. The heat and steam rising from the water hopper enter the tin can and keep the oil warm. The can also prevents chaff and dirt from sticking to the oil-cup glass.

## Hydraulic Scale for Crane

The hydraulic scale shown in the illustration is a novel adaptation of hydraulic pressure as a means of weighing directly




**A Hydraulic Scale for Use on a Crane as a Safeguard against Overloading, Which can be Readily Detached**

any machinery or parts lifted by a crane. It is not necessary for a workman to attend to this scale, as there are no sliding weights or springs needed. The entire scale weighs only about 30 lb., and is interposed between the load and crane hook so that it registers every load that the crane carries, and thus safeguards the equipment against overloads.

A cylinder, about 3¾ in. in inside diameter, is fitted with a piston provided with cup-leather packing, as shown. The piston rod is 1 5/32 in. in diameter, and the effective piston area is thus about 10 sq. in. The cylinder contains oil, and a pressure gauge, on which the pressure reading is shown in pounds per square inch, is connected to it. The weight of a load is obtained by multiplying the pressure-gauge reading by 10, which can be done mentally in an instant.

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## Facing Mixtures for Concrete Work

Many workers in concrete are more or less of the impression that the familiar, and frequently hideous, smooth, gray, monotonous, and uninteresting surface left by the forms is the only effect obtainable. However, a surface almost identical in appearance with granite or other pleasing stonework may be produced in a simple and inexpensive manner. This is accomplished by using a thin facing of cement mixed with small crystals of crushed quartz, or similar materials of different colors.

If the section is thin, say up to 4 in., it generally would not be too expensive to cast it entirely of the facing concrete, which is composed of 1 part of white cement to 2 parts of the crushed quartz. However, if the portion to be poured is more than 4 in., so that the expense of using the quartz particles for the entire thickness would be too great, a thickness of about 1½ in. of the finer materials will be found sufficient, and a less expensive and coarser mixture can be used for the rest of the piece. This is accomplished by placing a piece of expanded metal, of the smallest available mesh, inside the forms and about 1½ in. from the face. The facing mixture, prepared as previously explained, is then poured into this small outside space until it has piled up about a foot deep, when it is rammed down well with a rod. As the mixture begins to run through the expanded metal, the common concrete mixture, composed of the usual materials, is poured into the space between the expanded metal and the back of the form, until it has piled up to a point several inches below the facing mixture.

It is very important that the front, or facing concrete be always kept at a greater height than the backing concrete while the pouring is being done, so as to prevent any of the latter from running forward and getting into the front part of the mold, thus spoiling the effect. Also, the facing mixture should be mixed "dry," so that it will not flow too easily. A dry mix is one that uses just enough water to hydrate the cement.

A variety of finishes is possible. The form may be stripped while the concrete is still "green" or incompletely hardened, and the surface wire-brushed so as to show the quartz and produce a rough effect, or it may be ground down until absolutely smooth, when it will take the appearance of polished granite. Still another possible method is to bush-hammer it in lines, either narrow or wide.—Gilbert I. Stodola, New York City.

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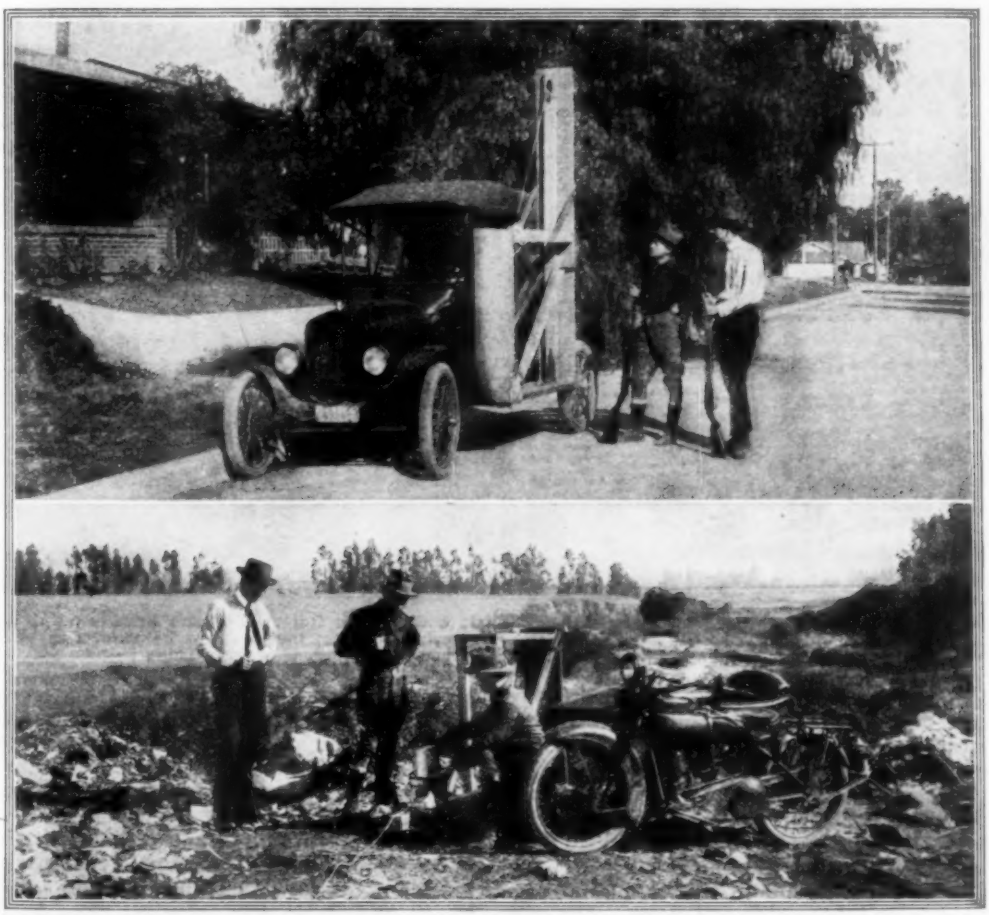
¶In grinding, a fast work speed will wear out the wheel faster than a slower work speed. The work speed should be adjusted so as to secure the longest life of wheels consistent with efficient production.

Amateur Mechanics
Information as to where to obtain any specified materials or parts for making objects described in the following pages may be had, on request, from our Bureau of Information.—Editor.

# Tin-Can Pigeons Catapulted by Simple Machine

By JOHN EDWIN HOGG

SHOOTING at flying targets is an alluring pastime, but the cost of clay pigeons, and machines for throwing them, is usually too high for the amateur. However, one need not, for this reason, abandon the idea of enjoying the sport, since with a little ingenuity, an excellent catapult can be constructed from material that is available everywhere and can be procured at a very small cost. By using such a homemade catapult to hurl tin cans, as much sport can be provided for the marksmen as with the expensive purchased machines, with the additional advantage of eliminating the cost of clay pigeons. If there is plenty of clay available in the vicinity, it may be found desirable to use lumps of thoroughly dried

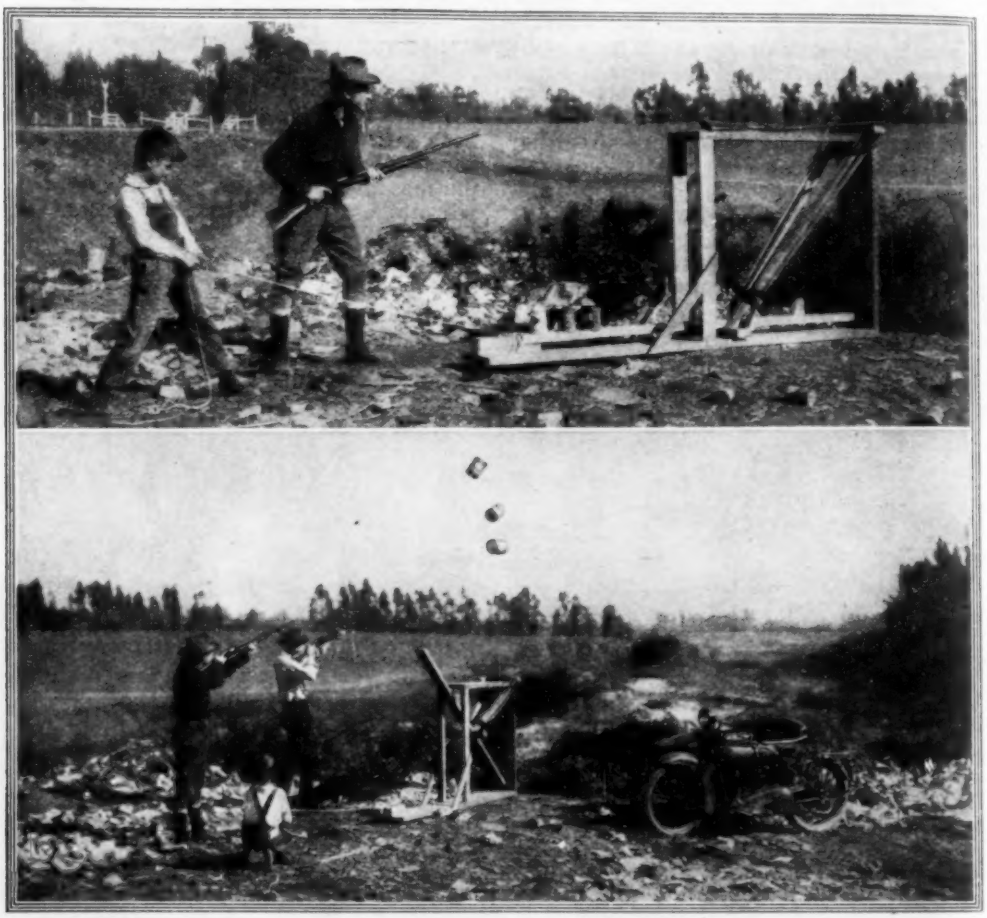


Above: The Enthusiastic Marksmen Strap the Catapult on the Running Board of a Small Car, to Convey It to the "Hunting Grounds." Below: Loading the Catapult; All That Is Necessary Is to Draw the Arm Down, Catch It to the Base by the Bolt, and Place the Cans on the End

clay instead of tin cans, as these lumps, upon being hit in the air by a bullet, are shattered and thus give visible proof of having been hit.

In appearance, the catapult, as made by an ingenious trapshooter of Alhambra, Calif., is not very different from the type of catapult used in medieval times; it is, however, somewhat modernized in

As soon as one of the marksmen calls out "pull," the cord is pulled, and the targets are hurled into the air with considerable force. They are frequently thrown to a height of 100 ft., and remain in the air long enough to give the marksmen sufficient time to shoot four or five times. The cord that releases the bolt can be pulled by foot, or, if desired, by a small



**Above: The Catapult Loaded, and About to be Released; a Cord Pulls Out the Bolt and Releases the Arm. Below: A Snapshot, Showing How Effectively the Device Operates; the Load can be Thrown as High as 100 Feet, Giving the Marksmen Time to Shoot Four or Five Times**

that the motive power is supplied by a pair of discarded automobile inner tubes, attached to the top of the upright, and to the throwing arm.

When the arm is brought down against the base, the tubes are placed under tension. The end of the arm is then hooked to the base by a common door bolt, fastened to the end of the base, that can be released by pulling a cord. The tin cans are then loaded on the end of the arm as shown in one of the photographs.

boy, who will usually be only too eager to do so. By changing the tension of the tubes, the height can be varied to suit the taste of the marksmen. When the targets hit the ground, the process is repeated.

The construction of the catapult is quite simple, and is shown very clearly in the photos. The frame is made of 2 by 10 and 2 by 4-in. planks. The base is about 8 ft. long. The catapulting arm is a little shorter than the base, and one

end is hinged securely to the latter. The arm, after release, is suddenly arrested when it strikes the top piece of the frame, throwing the cans into the air.

### Emergency Plug for Crankcase

Having broken off the drain plug under the crankcase of an automobile, while driving over a rough road, and not having a large-size cork to substitute for the plug, a quick repair was made with an old inner tube. The tube was cut across, and a small piece, about 4 in. wide, was cut from one end. The small piece was folded and placed directly over the hole, the remainder of the tube being stretched tightly over the folded piece, and wired firmly to the frame on each side. It was found that this plug was quite effective, and it was used for a week before a new drain plug was obtained.—George Auringer, New Rockford, N. D.

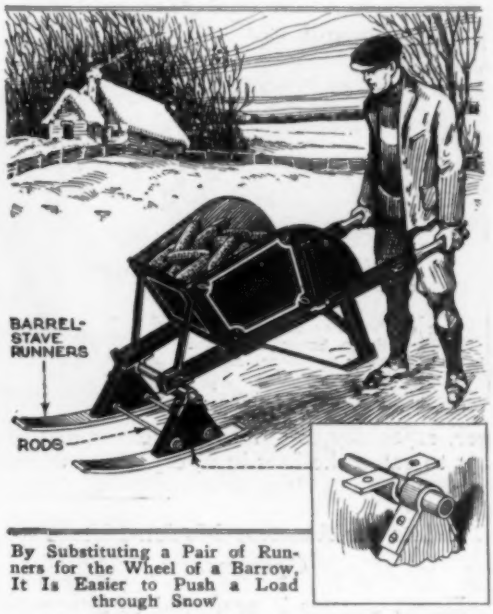
### Novel Lamp Shade

The illustration shows an inexpensive but beautiful lamp shade that is well worth the slight trouble of making. A wood or metal frame of the desired size and shape is constructed as indicated, each side of the frame being rabbeted, or bent, to hold two sheets of clear glass, separated from each other about ¼ in. Glass bottles, and broken glass ornaments of all colors, are crushed into small fragments, which are thoroughly mixed and packed between the glass sheets. After all the sections are filled with the fragments, the frame is fastened together and mounted on the lamp. It will be found that a beautiful tint results when the light is turned on.—Marshal South, Oceanside, Calif.

### Runners for the Wheelbarrow

Pushing a heavily loaded wheelbarrow through deep or crusted snow is hard work, but if runners are substituted for the wheel, the task becomes easy.

Obtain two equally wide and thick barrel staves. Cut out triangular blocks of 2 by 8-in. wood. Place the blocks on the concave side of the barrel staves, and fasten with wood screws, countersinking




By Substituting a Pair of Runners for the Wheel of a Barrow, It Is Easier to Push a Load through Snow

the heads. Fit a trunnion, made of pipe, to the top of each block by means of flat-iron brackets, as shown. After removing the wheel from the barrow, pass the trunnion through the brackets and the wheel bearings to serve as a pivot. The runners should be braced securely by means of two iron rods, passed through the blocks, as shown, and fastened by means of nuts, inside and out.

### Skirt on Barrel Foils Rodents

Light, roughly constructed barrels, such as are made for shipping lime, are often used as containers for animal feed, and the like, but are not immune to mice and rats. To prevent the rodents from getting at the contents by climbing over the side, tack a skirt of heavy paper, or fairly wide and thin sheet metal, around the bilge of the barrel, as shown in the illustration.—Louis Schneider, Clinton, Miss.

### Removable Foot Scraper

The ordinary foot scraper, although simple to make, is often a source of danger, especially to children, because one is apt to catch the foot in it, especially when mounting the steps carelessly from the side. It has been found, however, that a removable foot scraper, of the type shown in the photograph, not only retains the advantage of simplicity, but is comparatively safe, as it is easily swung out of the way when not required.

A Removable Foot Scraper That Is Both Practical and Safe. Left: Scraper Swung Out of the Way and Held by a Pipe Strap Screwed on the End of the Step Above. Right: Scraper in Use

The scraper consists of three parts: two short lengths of ½-in. pipe, and a strip of flat iron or steel. Slots are cut in the ends of the pipes and the steel strip is fitted and riveted in place. The pipes fit in ½-in. holes drilled in the end of a step. When not in use, as in fine weather or when the children are playing around the steps, the scraper can either be removed entirely or can be swung around and one leg dropped behind a pipe strap screwed on the end of the step above.—Glen McWilliams, Detroit, Mich.

### Hints for Amateur Motion-Picture Operators

Direct current is preferred to alternating current for arc lighting in motion-picture projection, as it gives a clearer and steadier light. The carbons used should be soft, as soft carbons are much superior to hard ones with soft centers. The tighter the carbons are held, the better the light will be. After the carbons heat up, the ends can be brought much closer together than at first.

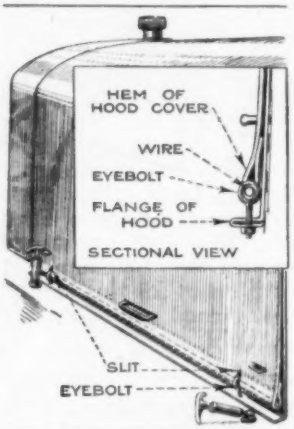
The mechanism of a motion-picture projector is delicate, although not frail, and frequent oiling is necessary. If a part of the machine breaks, do not try to substitute something for the broken part; this usually only means more trouble, and more annoyance to the spectators. Close the show, and replace the broken part with a new one.

Clearness of the picture depends largely upon the screen. A sheet hung across the room is not satisfactory, as the surface is never perfectly smooth, and the slightest breeze will wrinkle and bulge it, causing the picture projected on it to become distorted. A good screen can be purchased at a very reasonable price, and the investment will be repaid by better pictures.

One thing that especially tries the patience of an audience is the delay involved in changing reels in one-machine booths. To avoid this operation as much as possible, obtain reels that are about twice as large as the ordinary reels, and wind the film of two small reels on a larger one, connecting the ends. It is necessary, of course, to rewind the film twice, so that the parts will be projected in proper sequence, and to use a large reel in the lower magazine.—Thomas Duncan, Des Moines, Ia.

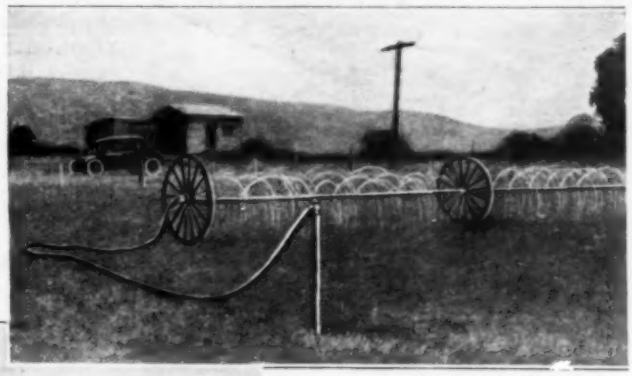
### Fastening Automobile-Hood Covers

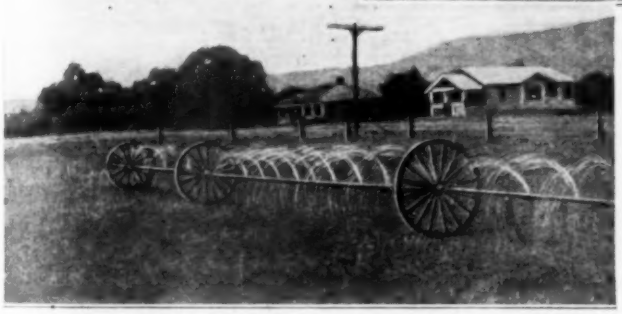
To keep automobile-hood covers neatly in place, drill a small hole through the lower flange of the hood, about 3 in. from each corner, and insert a small eyebolt in each hole. Cut slits in the hem of the hood cover to fit over the eyebolts. Run a wire, about 3/16 in. in diameter, through each hem and through the eyebolts. Then tighten the eyebolts with the nuts; this will draw the cover smoothly and tightly over the hood.—John A. Blaker, West Auburn, Mass.



## Movable Overhead Irrigation System

A very convenient overhead irrigation outfit is made by spacing four buggy wheels about 15 ft. apart along a line of galvanized-iron pipe of approximately the same diameter as the axles. One end of the pipe should be capped and the other threaded for a hose connection. Holes are then drilled at suitable intervals along the center of the pipe. Small standpipes, placed at 50-ft. intervals along one side of the plot to be watered, will provide a fine overhead irrigating system for which but 25 ft. of hose will be needed. The entire system is easily moved wherever it is needed. The illustrations show an outfit of this type in operation on an alfalfa patch, in which the standpipes are set in the middle of the plot. The sprinkler is moved down one side and up the other, and serves an area 90 ft. wide. —S. D. Hooper, Spokane, Wash.





**A Movable Irrigation Outfit Made from Perforated Pipe and Four Buggy Wheels: It is Shown Watering an Alfalfa Patch. Standpipes, 50 Feet Apart, Make It Possible to Use Only 25 Feet of Hose**

## Eliminating Scratch from Phonograph Records

It has been found that the objectionable scratching of phonograph records can be eliminated to a great extent by applying lycopodium powder, obtainable at any drug store for a few cents an ounce. This powder is extremely fine and will penetrate the smallest pores. When used on phonograph records, it fills up the minute crevices that cause the scratching. The record should be warmed a little before applying the powder, and afterward allowed to cool thoroughly.—C. I. Reid, Millersburg, Pa.

## Cleaning Piano Keys

Yellow keys on a piano give the keyboard a very unpresentable appearance. After some experimenting, it has been found that the original whiteness can be restored by applying a weak solution of nitric acid and water.

Add 1 oz. of nitric acid to 12 oz. of soft water. Be sure to pour the acid into the water, and do so very slowly, stirring with a stick at the same time. Apply the solution sparingly to the keys, taking care that no acid gets on the black keys, on the woodwork, or between the keys. Rub the keys with a piece of cheesecloth to remove the stain. Then wash off all traces of the acid with a piece of flannel dipped in clean water, and wipe with a dry cloth. It is sometimes necessary to give the keys two applications.

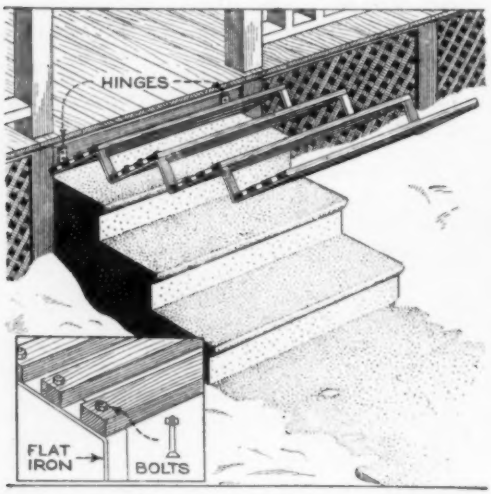
The solution may be put in a rubber-corked bottle, and kept for future use if desired. As nitric acid is a corrosive poison, the bottle should be marked to distinguish it from others, should be kept entirely out of reach of children, and should not be allowed to touch the fingers.

## Harvesting Ice

A layer of snow lying on the surface of ice that is to be harvested, acts as a blanket and retards the formation of new ice underneath. It is therefore necessary to dispose of this snow. The simplest way to do so is to flood the ice field with water; this dissolves the snow, and upon freezing, forms a new layer of ice over the old ice.—John M. Smith, Chicago, Ill.

### Making Cement Steps Safe in Winter

Owing to the accumulation of ice on the surface of cement steps during winter, they not infrequently cause accidents.



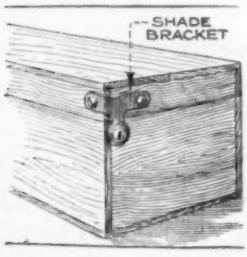

An Iron Frame, Provided with Wooden Treads, Eliminates the Danger Caused by Ice Accumulating on the Surface of Concrete Steps

The danger can be eliminated, to a large extent, by covering the steps with a frame, as shown in the illustration.

Two lengths of flat iron are bent to conform to the shape of the steps, and 1 by 1½-in. wooden strips are bolted across them, as shown. The strips are spaced about ¾ in. apart. Hinges are screwed to the riser of the upper step on the porch, so that the whole frame can be swung up when it is necessary to clean the steps. The hinges should have loose pins, so that the frame can be detached entirely when the winter is past.

### Window-Shade Brackets Used for Hinges

Ordinary brackets that are used on window shades have been found to make good hinges for the covers of small boxes and tool chests. The brackets are bent to make them fit around the corners, as indicated. The ears of each bracket are screwed to the cover, and the brackets are pivoted on wood screws driven into the sides of the box.—Harold Jackson, Kankakee, Ill.

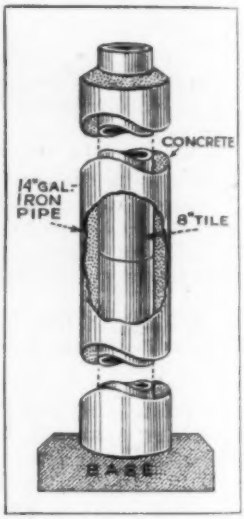



### Pen Drawings from Photographs

To produce a neat pen drawing from a photograph, carefully trace and shade the photograph with India ink, using a very fine and flexible pen point. When dry, immerse the print in a solution of sodium oxide, then in a solution of tincture of iodine and water, just enough iodine being added to the water to give the solution a bloody color. When the print is immersed in this solution, the iodine immediately attacks the emulsion of the print. After remaining in the iodine bath for a few minutes, until the back turns blue, the print is transferred to a hypo bath, which bleaches out the iodine, the lines of the sketch remaining unaffected. While the print is immersed, care must be taken not to touch the drawing, as the India ink will easily rub off in water.

### Substantial Fireproof Chimney

A substantial fireproof chimney was built by a tinner at a cost far lower than that of an ordinary brick chimney. It consists of 8-in. clay tile, concrete, and 28-in. lengths of galvanized-iron pipe, 14 in. in diameter. The tile and pipe are set in a concrete base and the 3-in. annular space between them filled with concrete.—H. V. Smith, Wauseon, Ohio.




### Preserving Inner Tubes

The motorist will find the purchase of an inner-tube bag, or box, to be an excellent investment; or a wrapping of soft cloth, placed around the tube in such a manner that the folds of the rubber cannot chafe against each other, will add considerably to the life of the tube. Tubes, even repaired ones that are carried as spares, should never be thrown carelessly into the tool box, where they are likely to be injured by the sharp cutting edges of the tools and rendered useless for an emergency.

# Building a Two or Three-Step Spider-Coil Receiver

By F. L. BRITTIN

THE type of instrument described in this article is very similar to the one-step receiver described in the February number, and it is recommended that the reader study that article, if he has not already done so, before attempting the construction of the sets described here. In fact, this is essential, because, as the spider coil employed is identical in construction in all three instruments, no attempt is made herein to give instructions for winding.

The condensers used in these instruments are also the same as those used in the one-step receiver. Rotary-plate condensers may also be used, of course, but, when using this type, the rotary plates, in the feed-back condenser, must be connected to the aerial, and, in the tuning condenser, to the ground. These condensers are plainly marked in both circuits.

The rheostat used in the detector-tube filament circuit should be of the vernier type, as a close adjustment of the filament current is necessary at this point, to obtain the best results from the detector tube. The rheostat for the first step is of the ordinary type, in the two-step set, and that for the second step of the jack type. In the three-step set, all amplifier-tube rheostats are of the jack type.

Jacks and plugs, with ordinary rheostats, can be used in both circuits, if desired, but the jack rheostats are now generally available, and have certain advantages that make their use desirable.

It will be noted, in the two-step set, that the set only operates on either of the amplifying steps, and not on the detector; this set was purposely designed in this manner, to make its operation simpler for the amateur, who is interested only in receiving from the broadcasting stations.

In the design of the three-step instrument, however, the circuit is so arranged that the detector can be used alone, or in combination with one, two, or three steps of amplification, as the operator desires.

The first and second steps are the ones most used, the second always with a loud speaker. The loud speaker shown in the photo of the three-step outfit is highly recommended for the reception of broadcast matter. The horn is of "die-cast" wood, used in combination with a popular and efficient type of microphone, and is free from the characteristic vibration and overtones of the metal horn.

The audio-frequency transformers used in both instruments have a 10-to-1 winding for the first step, and a 5-to-1 winding for the second step. The third-step transformer, in the three-step set, has a 3-to-1 winding. These transformers are of the shielded type.

In both instruments, there are six binding posts, for the phones, at the front of each panel, connected by a brass strip at the rear. These permit the use of either phones or a loud speaker, as desired. It will be found, when using a loud speaker, that it is best to disconnect the phones.

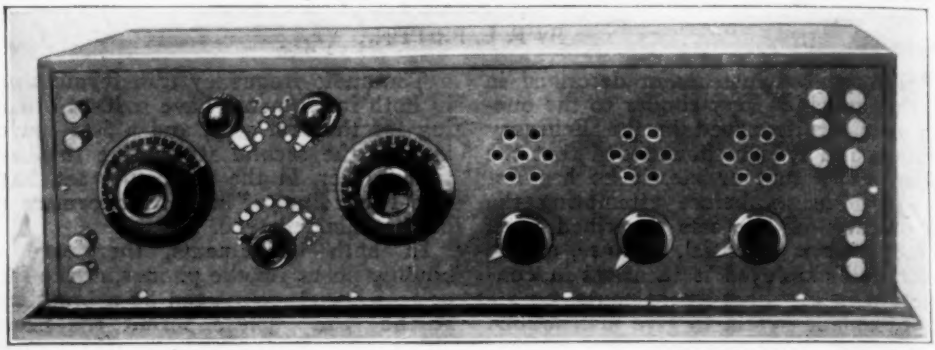
The panel used for the two-step set is 3/16 by 6 by 21 in. in dimensions, and that for the three-step instrument 1/8 by 6 by 24 in.—both of bakelite. All holes should be drilled before any instruments are mounted, and all connections must be carefully soldered, the enamel being scraped from enameled wire before soldering; this last may seem a useless warning, but cases are on record where a soldered joint was made on enameled wire, without first scraping it, and, as the cut ends of the wires were not covered by the solder, each wire was insulated from the other—and the builder was highly indignant because he could not get any results from his set.

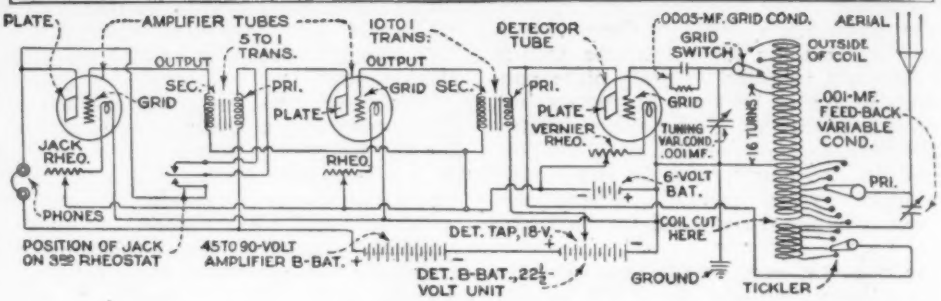
Use plain solder and a good soldering paste, tin the copper well, and use only enough solder to insure a good connection. Wire the various units neatly, using No. 14 tinned copper wire, covered with "spaghetti" tubing, and remember that the shorter the connections, the greater the efficiency of the instrument.

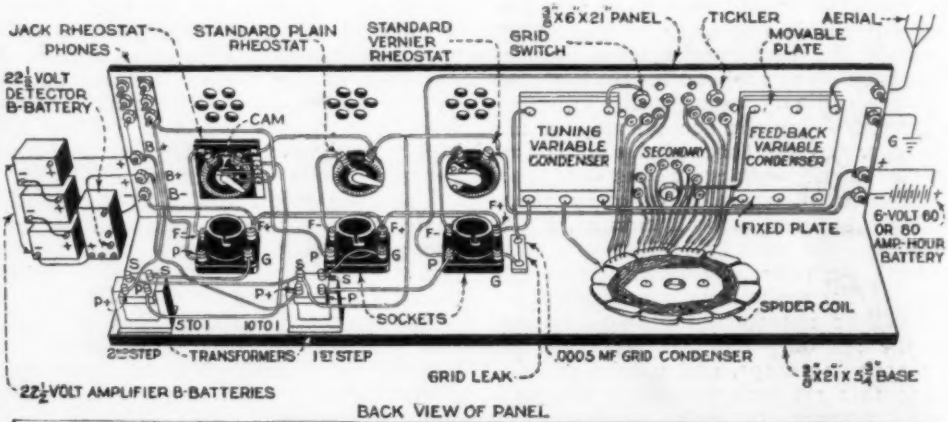
The detector tubes used are U.V.-200, and the amplifier tubes U.V.-201. Detector tubes vary; some will oscillate at a lower filament temperature than others. If the operator finds that he must burn the filament at an excessive brilliancy in order to make it oscillate, a small extra inductance can be inserted in the circuit. Make a small form, similar to that used for the large spider coil, and on it wind six turns of the same wire as used in the large coil. Wind the wire under and over every other "tooth," not skipping one as in the large coil.

Note carefully, on the two-step wiring diagram, the point where the lead from the tickler switch is soldered to the wire leading from the detector plate to the primary of the 10-to-1 transformer, and locate the same point on the instrument.

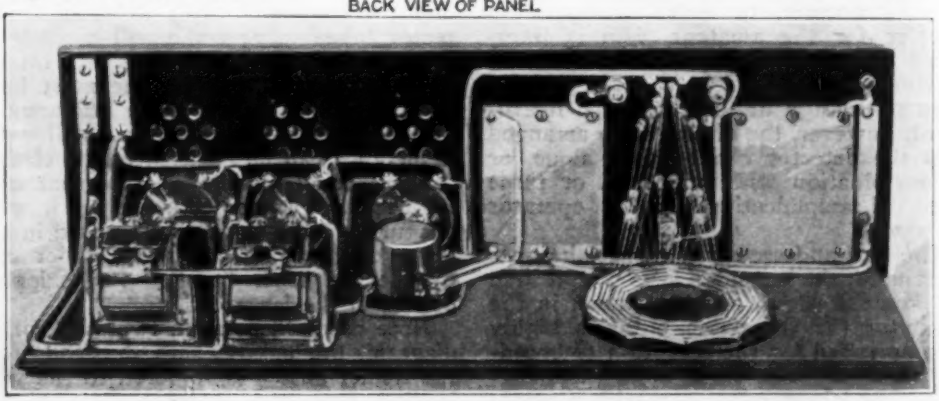
Between this point, and the trans-



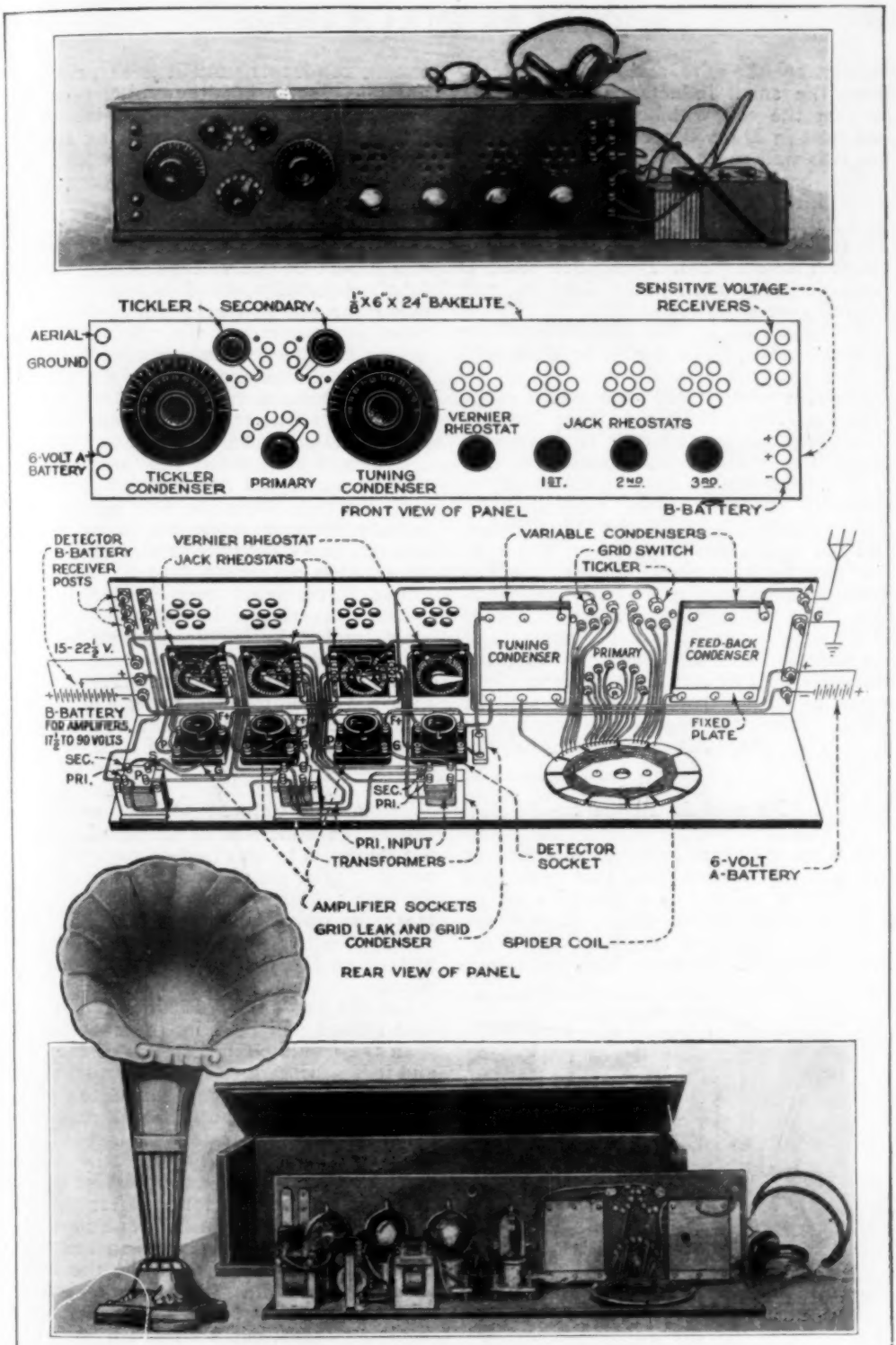



BACK VIEW OF PANEL.



Receiver with Two-Step Amplifier: Above, Front View of Completed Instrument; Center, Wiring Diagram and Drawing of Back of Panel, Showing Arrangement of Parts; Below, Rear View of Completed Instrument, Removed from the Cabinet. The Tubes are Removed from Their Sockets




Receiver with Three-Step Amplifier: Above, Front View of Instrument, with Phones, and Detector and Amplifier Batteries; Center, Layout of Panel Front, and Rear View of Instrument, Showing Connections; Below, Rear View of Instrument, Cabinet, and Type of Loud Speaker Recommended

former, cut the wire, and solder the leads from the small inductance to the ends, so that the coil will be in series. Only one tube in 20 or 30 needs this treatment, but it is well to know it.

The best type of aerial to use with these instruments is either a two-wire, 75-ft., flat-top antenna, or a single wire, 125 ft. long. It should be at least 40 ft. above ground. No. 14 copper wire is used for the aerial, the lead-in, and ground connections.

A few words on the operation of the instruments will, no doubt, be welcomed by the amateur.

The instruments will tune over a range of from 150 to 400-meter wave lengths. Supposing, for example, it is desired to tune in a station broadcasting at 360 meters. Set the primary-switch lever on the third or fourth point from the left, the grid-switch lever on the lowest point, and the tickler-switch lever on either of the two lower points. These are the usual positions, using an aerial as specified. The tuning is now done by means of the condensers. Turn the rheostats of the detector and first steps, burning the filaments no brighter than necessary. A point on the vernier rheostat will be found where the signals will come in best; vary the tuning by means of the tuning condenser until it is as perfect as possible, increasing the voltage on the first-step tube, if necessary. "Smoothing-out" is accomplished by varying the capacity of the feed-back condenser. If more volume is desired, the second step may be switched in.

Most of the fine tuning is done with the tuning condenser, and by the proper adjustment of the voltage of the various tubes, especially the detector. A good guide for the proper adjustment of the tubes is to increase the voltage until a hiss is heard in the phones, then reduce the voltage until the hiss just disappears; this is the point of best operation, and, especially when receiving distant stations, this adjustment is important.

Use a 6-volt, 60 or 80 ampere-hour storage battery as A-battery, and keep it well charged. Buy the best possible B-batteries—cheap ones are a waste of money; good B-batteries should last approximately a year.

The instruments may be inclosed in cabinets, as shown in the photos, if desired, and this is recommended. The author's experience with these instruments has been highly satisfactory, and they are recommended to amateurs who want an efficient instrument at a reasonable price.

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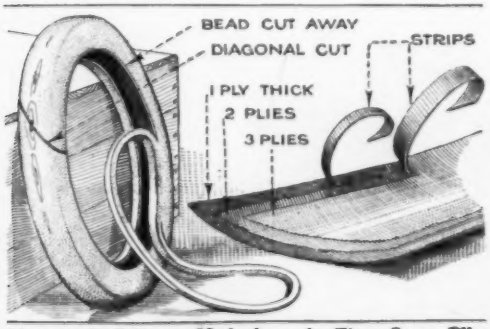
## Homemade Reliners

It is an easy matter to make excellent and serviceable reliners, that will add hundreds of miles to the life of a set of tires, from old fabric tires. If properly made and cemented in place, these reliners will hold the worst blow-outs, and make it possible to use tires until the tread and most of the fabric are worn off. It is almost impossible to puncture tires fitted with these reliners.




**Homemade Reliners, Made from the Three Inner Plies of Old Fabric Tires, Greatly Increase the Mileage of a Set of Tires**

To make a reliner, use an old fabric tire of the same size as the tire in which the reliner is to be fitted—a cord tire will not do. The condition of the tread and the outer plies of fabric is of no importance, as only the three inner plies are used. Neither does one bad blow-out matter, as the joint can be made at this place.

Cut the beads off both sides of the tire. The reliner will be 1 in. or more longer than the inside circumference of the tire, and it is necessary to make a diagonal cut across it. This can be done at the place where a blow-out or other weak part happens to be. Separate the three inner plies from the remainder of the fabric and the tread, using two pairs of pliers to start this operation. After a few inches have been separated, one part can be held in a vise, or placed on the floor and held under the foot, while the other part is pulled off. To make a feather edge on the reliner, to prevent chafing of the inner tubes, cut a strip, 1¾ in. wide, along the edge of the first ply, and pull it off, as indicated. Care must be taken not to cut the ply underneath. Then cut a strip from the second ply, about 1 in.

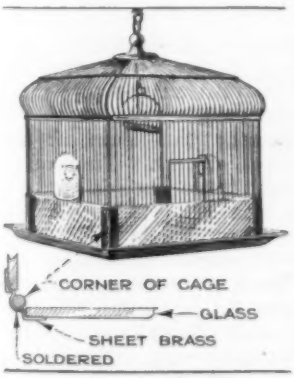
wide, and pull this off in the same way. Let the third ply remain as it is. Feather the ends of the reliner the same way.

The reliner is then ready to be inserted in the tire. Wash the inside of the tire to remove the talc or soapstone. Apply a thin coat of rubber cement to the back of the reliner and press it against the inside of the tire. After replacing the inner tube and putting the tire on the rim, inflate to the usual pressure, or about 5 lb. less, and let the car stand for a few hours before using.

The writer has picked up old worn-out tires on the desert roads in the western part of the country, and found it possible to use them from 300 to 1,500 miles, after fitting them with reliners made as described. To get the best results in using these reliners, insert them in the tires while the latter are still in fairly good condition, and before the tread becomes too badly worn. Reliners of any kind, however, should never be used in new tires, as they tend to stiffen them, and damage the tire in a manner similar to underinflation. Besides, the additional weight and thickness produce more heat, interfere with proper radiation, and cause the inner layers of fabric to be chafed and burned. In old tires, where bad breaks are present in the side walls, reliners will usually prove of benefit, enabling them to be used for many more miles before they finally give out.—F. L. Denton, Pasadena, Calif.

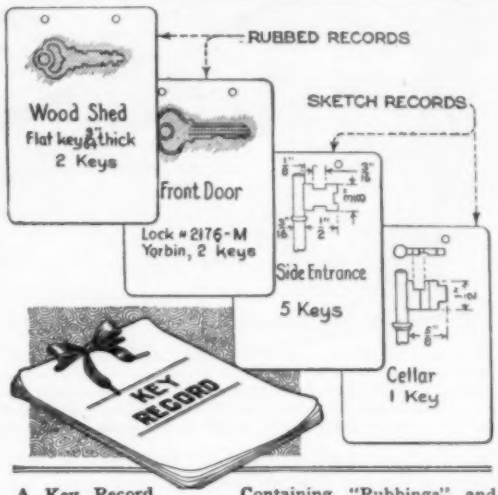
## Preventing Birds from Scattering Seed

The old idea of tying a bag around the lower part of a bird cage, or running a gathered band of cloth around it to prevent the bird from scattering seed over the floor, is considerably improved by the method shown in the illustration. Small pieces of sheet brass, or other sheet metal, about 1 in. wide and 3 in. long, are bent as shown, and soldered to the four corners of the cage, to hold strips of glass, 3 in. wide, in place. These strips present a much neater appearance than either bag or runner.




## Keeping a Key Record

It is a wise precaution to keep a key record such as shown in the illustration, in order to eliminate the necessity of taking locks off the doors, to fit keys to them when the originals have been lost.




A Key Record Containing "Rubbings" and Sketches of the Keys, and Such Data as Numbers and Designation of Locks to Which Keys Belong

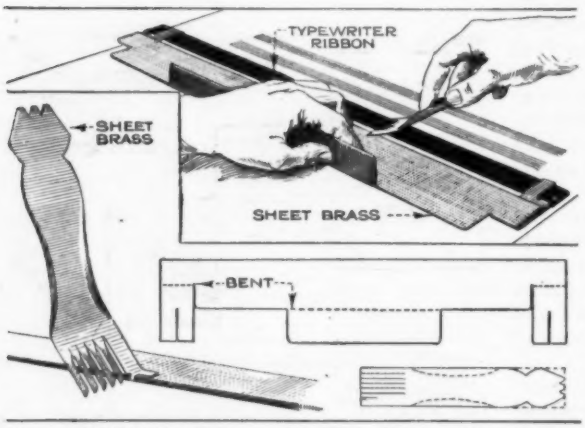
The key record illustrated consists of a loose-leaf book containing the "rubbings" and sketches of the keys; also such information as the key numbers, manufacturers' names, the designation of the locks to which the keys belong, and if possible, the exact dimensions of the keys. To make a distinct and accurate outline of a tumbler or flat key on paper, put the key under a sheet of paper and rub over the surface with a soft pencil. Some keys have grooves running parallel to the shank; the width and depth of these must be recorded accurately. Since keys with round shanks are more difficult to shade than flat keys, they are measured with calipers and a scale, and are then sketched accordingly. The thickness of the shank and the exact location of the collar must be shown.

## Measuring Diameter without Calipers

To measure the outside diameter of a pipe, shaft, or like object, when no calipers are available, tie two nuts or screws to the ends of a length of string and throw one end over the object. When the ends stop swinging, measure the distance between the cords. The measurement thus obtained is sufficiently close for ordinary work.

### Drawing Staff Lines for Music

The device shown in the illustration enables anyone to draw staff lines on ordinary paper, and thus produce music paper that is equal, for all practical purposes, to the commercial article.




Above: Staff-Ruling Instrument in Use, Showing How the Special Ruler and Inker is Used. Below: Ruling Instrument Proper, and Patterns for Both Instruments

The ruling instrument is illustrated in the lower left-hand corner. It is cut from a piece of 1/64-in. sheet brass, 5 in. long and 3/4 in. wide. At one end, 5 slits are cut, 5/8 in. long and 1/8 in. apart, and 1/16 in. from one side a short slit is cut. Five of the prongs are twisted at right angles, as indicated. The sixth prong is bent as shown, to form a lip that will bear against the edge of a ruler.

Using this instrument, carbon paper, and a ruler, very good music paper may be made, but the carbon lines are apt to rub off, so the combined ruler and inker, shown at the upper right, was developed. This makes permanent lines. It is made from a sheet of 1/16-in. brass, 1 1/2 in. wide and 7 in. long, cut as shown. The ears at the ends are 1 1/8 in. long, and about 1/2 in. wide, and are bent back as shown, and slit to take a wide typewriter ribbon, which is passed through the slits and drawn taut. The lip of the ruling instrument slides on the straight edge, and the prongs on the typewriter ribbon. —H. P. Tevonian, New York City.

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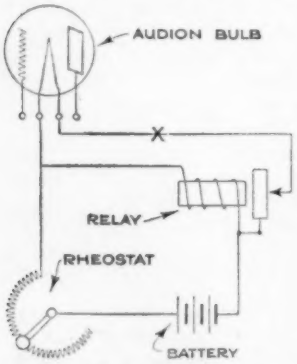
### Automatic Cut-Out for Audion Bulbs

Many vacuum detector and amplifier bulbs are damaged by allowing an excess of current to flow through the filament. Fuses are unreliable because the exact fusing point is seldom known to the operator, and even a small excess in the flow, if continued, will result in injury to the bulb. An automatic cut-out that will prevent this is shown in the diagram. The only extra equipment necessary is a small adjustable spring-type relay of from 75 to 250 ohms' resistance, and with the contacts arranged to break when the relay is operated.




The relay is wired in the filament circuit in the manner shown. An ammeter is required to make the proper adjustment of the relay, and should be connected in series with the filament at the point X. All the resistance on the rheostat should be cut in to start with; if the relay operates at this point, put enough tension on the armature spring to keep it inoperative. Resistance should then be cut out of the circuit slowly, the ammeter being watched for the maximum current flow that the manufacturer has specified for the particular bulb being used. Should the relay operate before that point is reached, more tension should be put on the spring, and if necessary, the armature should be set back farther from the core. This adjusting should be continued until the relay operates at the point of maximum allowable current as shown by the ammeter, and fails to operate at any lower point. The ammeter can then be removed from the circuit. Thereafter, whenever too much resistance is cut out on the rheostat, the relay will operate, cutting off the current from the filament. By cutting the resistance in again, the relay will drop back to normal, and the filament will again be lighted. The adjustment of the relay should be checked by means of the ammeter whenever a change in bulbs is made.

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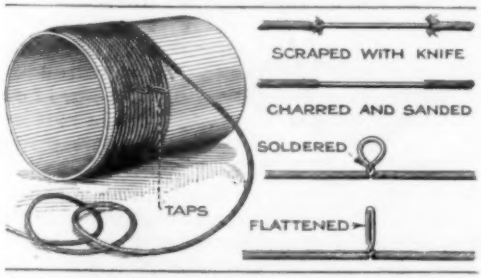
¶ Broom handles make good rollers for moving heavy boxes and other flat-bottomed articles.

### First-Aid Kit Carried in Gunstock

Hunters who are accustomed to carry a first-aid kit with them will find the method of keeping the kit in the gunstock very convenient. The butt plate is removed, and the gunstock hollowed out between the screw holes, to provide space for the kit, which consists of such articles as a caustic pencil, plaster, absorbent cotton, iodine, a tourniquet, and a roll of cotton gauze. After these articles have been inserted in the gunstock, the metal butt plate is screwed down again over the opening.—Fred J. Pooler, Waterville, Me.

### Tapping Radio Coils

In the construction of radio coils, one should never attempt to bare the wire and make taps after the coils have been wound. This method is not only difficult but shows poor workmanship. The proper method is to make the taps during the winding process. Do not scrape the wire bare with a knife, which frays the braiding or sewing, but hold the portion to be tapped over the flame to char about 1 in. of the cotton or silk insulation. Then rub the copper with a piece of fine sandpaper or emery cloth until the wire is bright. Double the bare part and give it one full twist around. Having formed all the taps in this way, solder to them the wires that lead to the switch points.

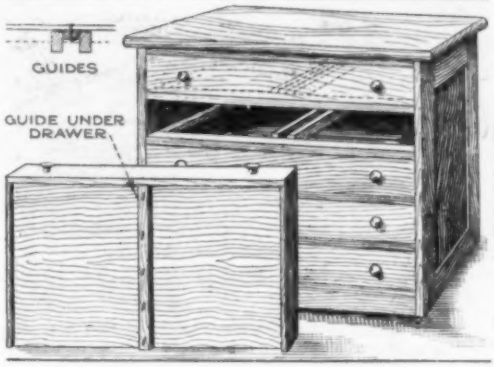



The Correct Method of Tapping Radio Coils by Charring the Insulation and Twisting the Bare Wire in a Loop While Winding the Coil

When completely finished, slip lengths of rubber tubing over the joints to make a neat-looking job. No. 16 or 18 copper wire should be used for leads from the taps to the switch points.—E. J. Bachman, Fullerton, Pa.

### Guide Prevents Drawers from Binding

The sides of a drawer are often planed down to eliminate binding, but usually this only increases the tendency to "cant." An excellent way of preventing drawers from binding or canting, is to provide each drawer with an additional guide, as shown in the drawing. The guide consists of a narrow strip of wood nailed




Binding and "Canting" of Drawers are Eliminated by Providing an Extra Slide in the Center

crosswise under the center of the drawer; it slides between two other strips that are fastened to the frame as shown.

### Kinks for the Tire User

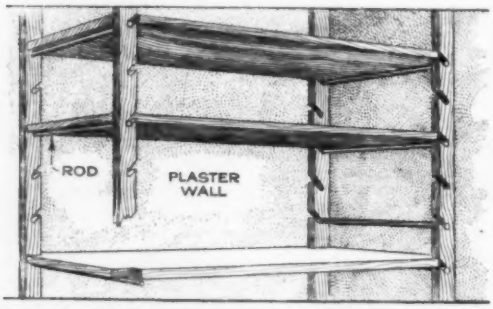
An inner shoe, made from part of a tin sign picked up along the road, proved to be an excellent repair for a large blowout. The piece of tin, 8 in. wide and 12 in. long, was made to fit snugly inside of the casing. The ends of the tin were allowed to project over the beads, and a length of old tube, slit open, was slipped around the inner tube to prevent the tin from cutting or chafing it. When the tire was inflated, the tin shoe reinforced the weak part of the casing effectively, and the repair, although intended to be only temporary, lasted as long as the tire, and did not cause any trouble. I now carry several of these tin "shoes," and some sections of inner tubes, in readiness for future blow-outs.

Small holes and cuts in casings should be filled with some "liquid rubber," a thick preparation that solidifies upon exposure to air. It can be procured at most any cycle shop. This treatment will help lengthen the life of a tire considerably, as it prevents small sharp stones from entering the cuts and penetrating the casing, and also prevents water from coming in contact with the fabric. The coating will wear off, and must therefore be renewed occasionally.

It will be found that the cutting of rubber is greatly facilitated if the blade of the knife is kept wet.—William J. Helm, Tampa, Fla.

### Portable Shelving for Closets

The portable shelving shown in the illustration can be installed in any closet, and can be removed in a short time without any trouble; it will not mar the walls, as no nails are used.

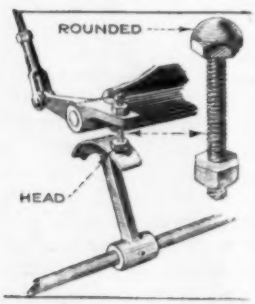



**Portable Shelving for Closets That does Not Mar the Walls and can Readily be Removed When Necessary**

Obtain four pieces of 1 by 2-in. wood, as long as the closet is high. Drill ½-in. holes every 6 in. along the wide side, and saw out slots, as shown, to fit the ½-in. wooden rods that support the shelves. Set the four uprights against the side walls of the closet and insert the top and lower shelves first. The shelves keep the uprights tightly against the walls, and are made to fit snugly by cutting out the corners as shown. Only one side wall is shown in the drawing, for the sake of simplicity.—P. A. Dasche, Astoria, N. Y.

### Improving Clutch Screw on Light Car

The adjusting screw that bears on the neutral cam of a light car, and is used to throw the engine into neutral automatically when the lever is pulled back, is quickly worn out and hence must be replaced frequently. The cause is that the end of the screw that makes contact with the cam is rather small. If the screw head is rounded, as shown in the illustration, and the screw is turned in from underneath, so that the head bears on the cam, it will last longer than if merely dressed and replaced as before, as the area of contact is much larger, and will not need adjustment so often.

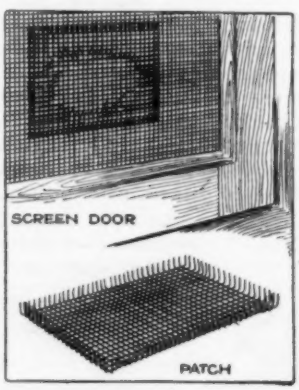



### Novel Method of Bailing Small Boats

With an 8-ft. length of common garden hose as the only implement, water can be bailed out of small boats in a simple manner. The hose is first filled completely with water by submerging it, then one end is held under the water with the left hand. The hose is grasped, near the middle, with the right hand, and, with a quick, rotary motion, the free end is made to whirl around the head. This will throw the water out of the hose, but as fast as the water is discharged, more is drawn in, making the flow continuous. It is astonishing to note how much water can be removed in a few minutes by this method.—D. C. Cox, Pittsfield, Mass.

### Screen-Door Patch

To cover a hole in a screen neatly and effectively, cut a rectangular piece of screen a trifle larger than the hole, and pull one or two wires from each edge. Bend the ends of the projecting wires over as shown in the illustration. This may be done by placing on the patch a piece of thick cardboard of the same shape, but a little smaller, and then bending the ends of the wires against the sides of the cardboard. Place the patch over the hole so that the points will project on the other side of the screen, and flatten them down toward the center of the patch.—P. F. Schecker, St. Marys, Kan.

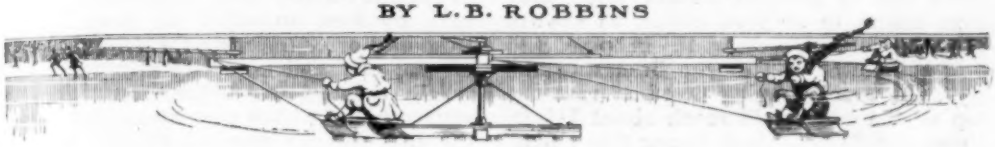



### Simple Repair for Dished Wheel

After a front wheel of a car had been badly dished in an accident, it ran untrue and consequently caused uneven wear on the tire. To remedy this, I took out the hub bolts and hub, replaced the latter from the other side of the wheel, and drew the hub bolts up tightly. The wheel, repaired in this way, ran perfectly true, and it was found unnecessary to purchase a new one.—A. Bronson, Argyle, Wis.

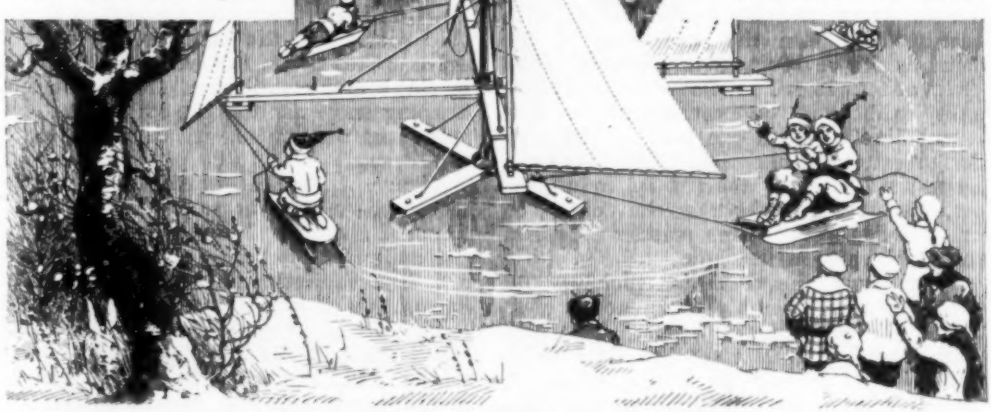
# A MERRY-GO-ROUND FOR THE ICE

BY L. B. ROBBINS



EXHILARATING sport is furnished open-air enthusiasts by the novel ice merry-go-round described in this article. The device, although it reminds one of an ice boat, is, however, a new departure in ice coasting, the novelty consisting in the fact that the merry-go-round, which is itself stationary, swings the riders, who are carried on sleds, in circles around it. When desired, the cord or rope that holds the sled to one of the revolving arms, is released, and the sled with its rider is sent flying off over the ice. With a good breeze blowing, the merry-go-round revolves with considerable speed, yet is perfectly safe, if constructed according to the instructions. It can be built by anyone who has some knowledge of tools and how to use them, and who possesses enough ingenuity for details of construction.

The device consists, essentially, of three parts: the base, the revolving arms, and the sails. The construction of the base is shown in the plan and side elevation, Figs. 1 and 4, and the details of the lower works in Fig. 5. To make the base, cross two pieces of 2 by 6-in. spruce, 6 ft. long, at right angles to each other to form four legs. The surfaces of these crosspieces should be flush, which can be accomplished by half-lapping them at the junction. Bore a ½-in. hole through the end of each leg so that a long spike can be driven through it and into the ice. Bolt the crosspieces together, and screw a 1½-in. pipe flange over the exact center of the joint, as shown in Fig. 5. Thread a 6-ft. length of 1½-in.



An Ice Merry-Go-Round That Provides All the Exhilarating Sport of the Ice Boat on a Pond or Small Lake: It is Equipped with Four Sails That Keep It Revolving at Considerable Speed. To Stop, the Sleds are Disengaged by Releasing the Ropes, and a Simple Form of Brake, Operated by a Long Lever, is Applied

pipe on one end, and screw it into the flange, so that it will stand exactly vertical; this is the shaft around which the arms are to revolve. Next rivet four iron braces to an iron collar, as shown. Slip the collar over the 1½-in. pipe, and bolt the lower end of the braces to the legs, the bracing being fitted so that the top of the collar will reach about 1½ ft. above the flange. Just above this collar, slip on another, provided with a set-screw. Then saw off part of a large pipe cap to form a shallow cup, about ¾ in. deep, and cut a circular hole in its bottom so that it can be slipped over the pipe to rest on the second collar. This forms a race for the ball bearing that supports the revolving arms; the balls should project a trifle above the edge of the cup. If available, a roller or ball thrust bearing should be used at this point.

The revolving arms consist of two 16-ft. lengths of 2 by 6-in. straight-grained spruce planks. Cross them at right angles to each other in the same way as the base legs. Do not half-lap them, however, as this would greatly impair their strength, but set one directly on the other, and bolt them together, countersinking the bolt heads. Then fasten four wooden braces around the center as indicated, lapping the ends so as to make them lie horizontal. Bore a 1¾-in. hole in the center of the joint, and bolt a 2-in. pipe flange to the upper timber directly over the hole. Thread a 3-ft. length of 2-in. pipe on both ends, screw one end into the flange, and fit the other end with a coupling. Fasten four wire stays to eyes welded to the coupling, or through holes drilled in the side and to eyebolts on the revolving arms. These stays should be provided with turnbuckles. On the underside of the joint of the revolving arms, bolt a wooden disk, about 18 in. in diameter, and drill a 1¾-in. hole in the exact center, so that it will line up with the hole in the pipe flange on the other side. Then screw a large steel washer, about 6 in. in diameter, with a 1¾-in. hole in the center, to the wooden disk. This washer rides on the steel balls in the race.

With some one to assist, pick up the revolving-arm assembly and place it over the 1½-in. pipe on the base. The metal washer will then rest on the steel balls, and about 3 or 4 in. of 1½-in. pipe will project above the coupling on the 2-in. pipe. Fit a collar over the 1½-in. pipe, with about 1/16-in. play between it and the coupling on the 2-in. pipe. Drill a ½-in. hole through both collar and pipe and bolt or pin them together.

A mast and sail is located on the end of each revolving arm. The mast is made of 2 by 3-in. spruce, 7 ft. long. After rounding or chamfering the edges, square off the end and taper it; also taper the whole mast toward the top. Saw a square hole in each arm about 1 ft. from the end, for the mast to fit in. Make a mast step by bolting three blocks together, as indicated in Fig. 3. Cut another square hole in the lowest block, in line with the one above, and step the mast, which will be held quite securely.

The booms can be made of lighter spruce. They should be provided with jaws, made of flat iron, to fit loosely around the mast. The sails are all of equal size, triangular shape, 6 ft. at the leach or mast side and 5 ft. along the foot or boom. Use 8-oz. white ducking and double-hem the edges. Sew in eyelets, about 6 in. apart, along the boom edge, and larger eyelets along the leach, to take mast rings. The mast rings can be made of stiff wire or can be purchased ready-made. Lace the bottom edge of the sail to the boom with stout braided cord. After placing the masts and sails in position, connect the outer ends of the booms, with lengths of rope, to the eyebolts that hold the wire stays. The ropes should be just long enough to prevent the sail from swinging out too far when gybed, or swung out. The correct position is shown in Fig. 1. Fasten a long bolt through each arm, as a stop for the boom when the sail is filled, and provide a large hook on the end of each arm to hold the rope that is fastened to the sled.

When completed, assemble the merry-go-round on smooth ice of sufficient thickness. Set the base on the ice and drive spikes down full length. Additional strength and stability will be obtained by heaping snow around the spikes and legs, splashing water over it, and allowing it to freeze.

Figure 1 indicates clearly how the merry-go-round works, the various positions of the sails being shown. Two of the sails are always catching the wind; one is completely filled just before the one ahead of it is gybed.

The sleds are equipped with strong rope, about 20 ft. long; one end is tied to the sled, while the other end is held in the hand, and the middle section, or bight, is slung over the hook on the end of the revolving arm. A better method of releasing the sled would be to have

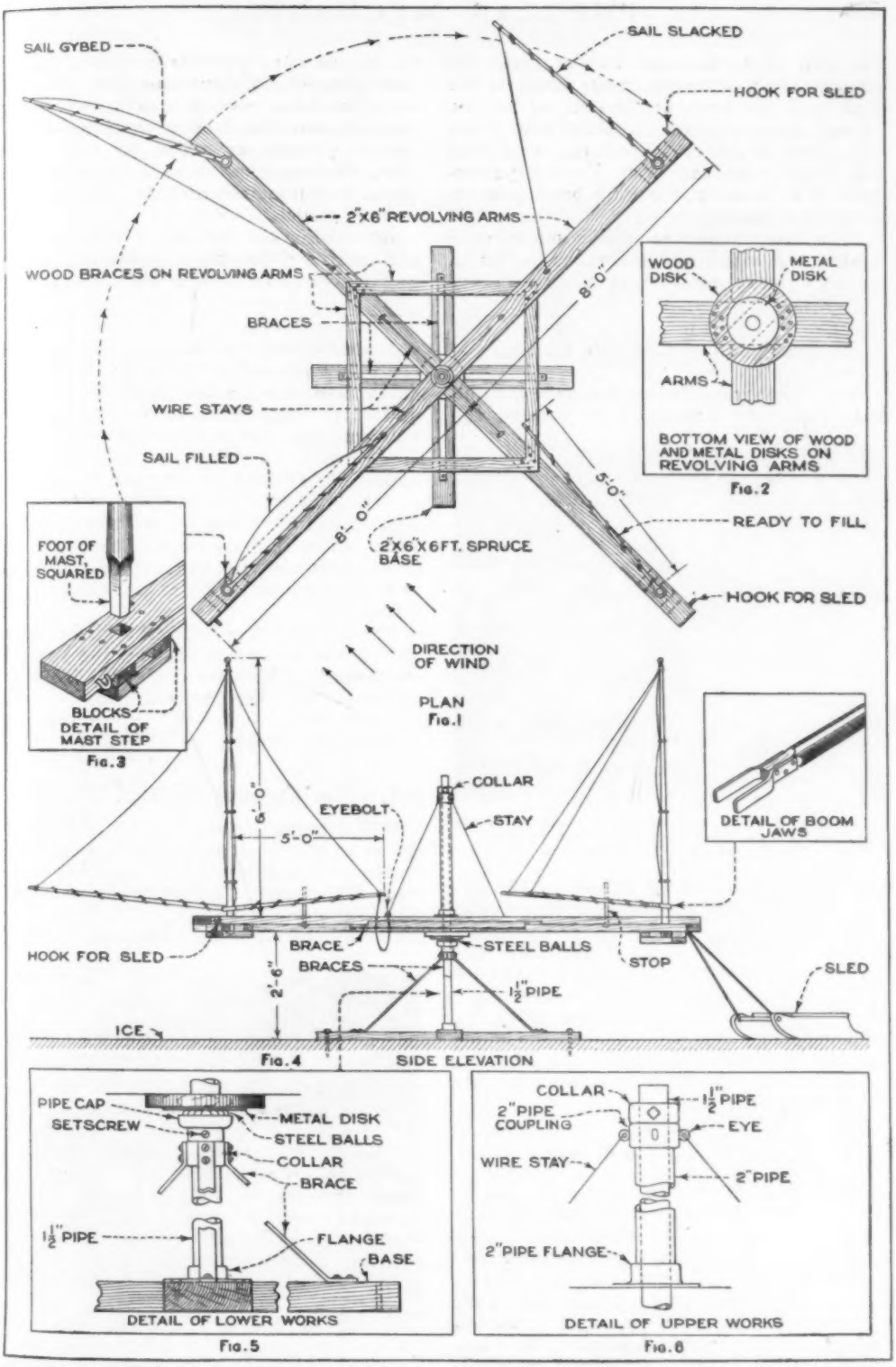



Figure 1: Plan Showing Base, Revolving Arms, and Braces; Also Positions of Sails in Relation to the Wind. Figure 2: Detail Showing Wood and Metal Disks on Revolving Arms. Figure 3: Squared Foot of Mast and Detail of Mast Step. Figure 4: Side Elevation, Showing Assembly of Merry-Go-Round. Figure 5: Detail of Lower Works. Figure 6: Detail of Upper Works

the sled ropes fastened to the arm, and attached to a screweye in the front of the sled by a slip knot, firmly tied, or by one or two turns around a hook. Then, when the rope is released, and the sled flies off, there is no danger of its being overturned by a long, hanging rope getting under the runners.

It is necessary to provide some kind of brake for stopping, especially when a strong breeze blows. A practical way to do this is to provide means of raising the whole revolving assembly, after all the sleds have been released, so that the coupling on the 2-in. pipe bears tightly against the upper collar on the 1½-in. pipe. This can be done in a number of ways, and one will quickly suggest itself to the builder.

By raising the booms of all four sails and lashing them to the masts, the merry-go-round can be kept at rest.

### Protection of Concrete Curbs

The photograph shows a simple method that has been employed to protect the

A Runway Used by a Gardener to Protect Concrete Curbing from being Damaged When Pushing a Heavily Loaded Wheelbarrow over It

concrete curbs of garden walks from being damaged by a wheelbarrow passing over them.

Two short 2 by 12-in. planks, fastened end to end by means of large hinges, are laid across the curb. No matter how heavily loaded a wheelbarrow may be while passing over the runway, no damage will result to the curb. In addition to this, the work of the gardener is considerably lightened.

### Heat Shield for Range

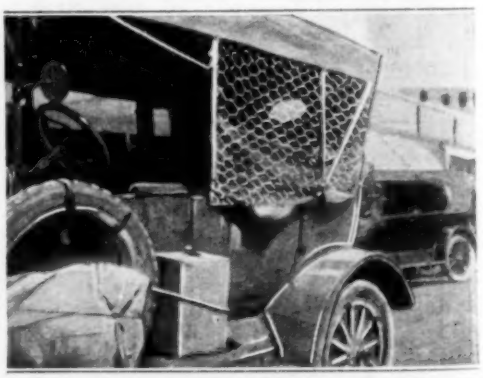
Many fires in residences can be attributed to the fact that the kitchen range is placed too close to the woodwork or wall behind it. As a precaution against this danger, a sheet of metal is usually tacked to the wall. However, this is not at all satisfactory or effective as the metal, being an excellent conductor of heat, transmits the heat to the wood under it, and also prevents the radiation of heat from the wood.

A shield that has been found very efficient is arranged as follows: A piece of galvanized sheet iron, about 30 in. wide and 1 ft. longer than the range, is hung between the range and the wall. The sheet iron is suspended by means of two small angle brackets screwed to the top of the wainscoting, behind the stove. The shield is attached to the brackets with stove bolts, placed through the screw holes in the ends of the brackets, and through small holes punched in the shield.

The air between the wall and the shield rises upon being heated, and the space is continually filled with cooler air from underneath, so that the woodwork cannot become very hot.—W. S. Standiford, Youngstown, Ohio.

### Safety Car Curtains Made of Wire Mesh

While motoring with small children in the rear seat, it is necessary to watch the youngsters continually, to prevent them from falling out. This constant watchfulness was entirely eliminated by one tourist, who used common wire mesh to cover



Wire Mesh Covers the Open Sides of the Car, and Prevents Children from Falling Out

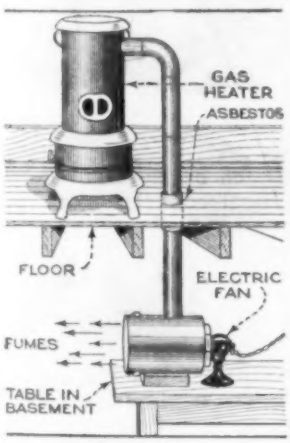
the open sides of the rear seat, as shown in the photograph.—Jane Fredrickson, Los Angeles, Calif.

### Pencil Sharpener Makes Dowels

Our woodworking department was called upon to make several thousand small pointed dowels, and no cutter of the proper size was available. As it was necessary to turn the work out at once, a small rotary pencil sharpener was pressed into service, and was found to perform the work satisfactorily. The sharpener was fastened to a board, and a small wooden pulley substituted for the crank. The board was then fastened to a high-speed machine so that the small pulley was pressed against the belt. By employing this method, the job was finished completely in less time than it would have taken to make a cutter. The pencil sharpener stood up well, considering the hard use to which it was put.—Charles Thiel, N. Andover, Mass.

### Winter Use for the Electric Fan

The illustration shows an excellent method of disposing of the fumes produced by a gas or oil heater, when there is no chimney near, and when the heater is used on the first floor of the house.

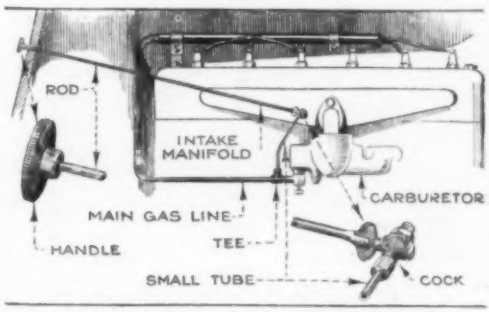



Connect one end of a flue to the top of the heater, as shown, and pass it through a hole in the floor into the basement. The hole in the floor must be lined with asbestos. Pass the lower end of the flue through a hole cut in the side of a lard pail, or similar container, laid horizontally on a table. An elbow is fitted on the end of the flue, the open end of the elbow being pointed toward the open end of the pail, and fitted as exactly as possible in the center of the latter. Cut a hole in the end of the pail, equal in diameter to the guard of a small electric fan, which is placed directly behind the hole. When the fan is operated, the strong current of air causes a strong draft in the flue.

The cost of running the fan is about the same as that of burning a 40-watt lamp.

### A Homemade Primer

The illustration shows a simple primer for a car using a pressure gasoline feed. Cut the gasoline pipe leading to the car-

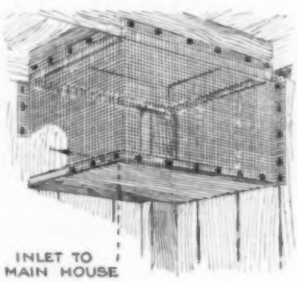



A Simple Primer for Automobiles That Have a Pressure Gasoline Feed: It is Operated by Turning a Small Knob on the Dash

buretor, and braze a tee in it, about 1 in. from the carburetor. Drill and tap the intake manifold as shown, and screw in a small petcock. Connect the petcock and tee with a length of copper pipe as shown. Rivet an iron rod loosely to the petcock valve, and bring it through the dash. Fit a handle or knob to the end. The primer can then be operated by the driver. A quick opening and closing of the valve will provide sufficient gasoline to start the engine in one or two turns.

### A Simple Pigeon Trap

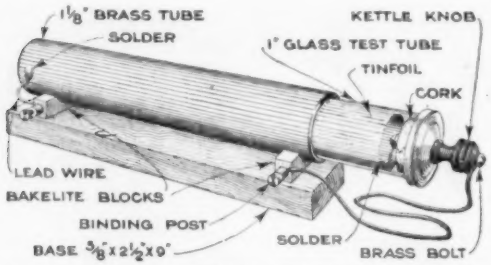
The trap shown in the illustration is built in one of the upper corners of a pigeon house. It is 1 ft. square, and has a wooden floor, two screen sides, and an open top. A small hole, that just allows a pigeon to pass through, is cut in one side, as indicated.




A few grains of corn are thrown on the floor of the trap to attract the birds. After a pigeon has alighted in the trap and eaten the corn, it finds the small opening and passes through it into the house. It is impossible for the pigeon to escape by returning through the trap, as the hole in the screen allows only the body to pass through without the wings spread.—Herman Kurth, New York City.

### An Easily Made Variable Condenser

A simple and efficient variable condenser that can be made by any amateur radio operator at slight cost is shown in the illustration. Many times the experimenter needs a small-capacity condenser but does not care to buy one of the rotary type for the work in hand. This condenser will answer all requirements, and if constructed as described, the capacity will be approximately .0005 microfarad. The base may be of hardwood or bakelite, and the supporting blocks, or saddles, are made of ⅝-in. bakelite, with a small binding post screwed into one end of each. The brass tube is 1/16 by 1¼ by 8 in., and has an inside diameter of 1⅛ in.; it should be clamped securely to the supporting blocks. The sliding unit is an ordinary 8-in. test tube with an inside diameter of 1 in. A sheet of heavy tinfoil, such as used by florists in the preparation of floral designs, 3½ by 7½ in. in size, is then fitted around the inside of the test tube, and a short lead soldered to it and to the inner end of the knob bolt shown; a long flexible lead is then soldered to the bolt at the end of the knob and connected to the binding post. This lead must be of sufficient length to allow the test tube to be withdrawn. A short length of wire is soldered to the brass tube at the rear and connected to the remaining binding post.




A Simple Type of Variable Condenser That Meets a Variety of Requirements in the Amateur's Radio Laboratory, is Easily and Inexpensively Built

### Suspended Rattrap Proves Efficient

To get results in catching rats, hang a spring-snap rattrap on the wall so that it will clear the floor about 4½ in., which is just high enough to enable the rat to reach the bait by standing on its hind legs. When the trap springs, either the back or the neck of the rat is broken. Common brown laundry soap has proved to be an excellent bait for these spring traps.—W. Norman Fox, Atlantic City, New Jersey.

### Using "Canned Heat" in Small Torch

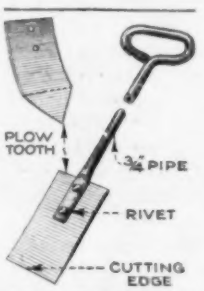
It very often happened that I found the fuel in my small alcohol torch had evaporated when I needed it and had no additional fuel on hand, so I bought a tin of "canned heat," and poured the contents, while melted, into the torch. Now when I wish to solder, I hold the wick end downward, and apply a lighted match to the end of the metal tube, causing sufficient fuel to be melted to saturate the wick so that it will ignite. If the flame dies down, it can instantly be revived by holding the torch down so that the flame will heat the tube.—J. R. Weyrich, Washington, D. C.

### Repairing Electric-Heater Elements

To repair a break in the resistance element of a heating appliance, straighten the ends of the wire for about ½ in., and scrape them clean. Take a short length of 3/32-in. brass rod and drill two small holes through it, about ⅛ in. apart, and pass the ends of the resistance wire through each hole twice, as shown. Close the holes down on the wires by hammering the rod. The resulting job will be neat and very effective. Merely twisting the wires around each other does not insure a good electrical connection, as the oxidation of the wire tends to insulate the wires, and solder cannot be used.

### Cutting Ice from Watering Tanks

The tool shown in the illustration has been found to be more useful than an ax to cut ice from watering tanks. It consists of an old plow tooth, riveted to a length of ¾-in. pipe. A plow tooth 5 in. wide is most suitable; it is cut off at the point where the sides begin to taper, and is sharpened to a cutting edge. The pipe is flattened at the end riveted to the plow tooth, and the other end is bent to form a handle. This tool is also of assistance for fitting ice cakes in the ice house.



# PRIZE OFFERS AND ANNOUNCEMENTS

### FOUR PRIZES FOR THE BEST STUDIES IN THE ECONOMIC FIELD

In order to arouse interest in the study of topics relating to commerce and industry, and to stimulate those who have a college training to consider the problems of a business career, a committee composed of five prominent men connected with various universities and newspapers has been enabled, through the generosity of Hart, Schaffner & Marx, of Chicago, to offer four prizes for the best studies in the economic field. The committee proposes six different subjects, but a competitor is not necessarily confined to these topics, and may choose any other subject, which must, however, first be approved by the committee. There are two classes, A and B, the latter to include only those who, at the time the papers are sent in, are undergraduates of any American college, and the former any other American without distinction. In class A there will be a first prize of $1,000, and a second prize of $500. In class B the prizes are $300 and $200, respectively. There is no limit as to the length of the papers, and they should be sent on or before June 1, 1923, to Prof. J. Laurence Laughlin, University of Chicago, Chicago, Ill.

### MAGAZINE'S BUREAU OF INFORMATION ANSWERS OVER 19,000 INQUIRIES

Nearly 20,000—to be exact 19,842—inquiries were received by the Bureau of Information of Popular Mechanics Magazine in the year 1922, an increase of 7,762 over the preceding year. Of these inquiries more than 19,000 were answered by letter, while 133 were answered by telephone, and 17 by telegraph.

All walks of life from day laborer to college professor are found among the questioners, many of them, too, living in far-away corners of the globe, southern Australia, Africa, and Alaska being often heard from. India is another country taking an interest in American products, though, according to the number of inquiries received, artificial limbs constitute the Indian's chief point of interest.

Two questions frequently asked are, "Where can I buy a 'divining rod' for locating minerals or buried treasures?" and, "Can you furnish us with details concerning the prize for perpetual motion?" Once in a while some man writes asking where he can find a wife.

### ENCOURAGEMENT OF UNKNOWN WRITERS REASON FOR LITERARY CONTEST

The belief that there may be in this country "greater poets than have yet been heard from and writers as excellent as any that have lived," is given as the reason for a $1,500 literary contest to be held by the New Pearson's magazine. Nine prizes are offered, three for the best short stories submitted, and an equal number for the best poems and best essays. It is suggested that the stories approximate 5,000 words, the poems 300 lines, and the essays 3,500 words. With the exception of the essays, which must be confined to "What Is Wrong with American Journalism?" there are no limitations as to theme or treatment. The closing date is May 1, 1923, at noon, and the address of the magazine, 799 Broadway, New York City.

### PRIZE FOR MIDSHIPMAN SHOWING BEST QUALITIES OF LEADERSHIP

A sword will be given annually to the midshipman at the U. S. Naval Academy who has given best evidences of leadership, and who has contributed most to the loyalty of the service. The award is to be made by the superintendent of the academy on behalf of the class of 1897, which has provided a trust fund of $2,000 for that purpose. A member of the class graduating this year will receive the first award.

### AMERICAN-SCANDINAVIAN SOCIETY TO AWARD SCHOLARSHIPS

Twenty traveling scholarships of at least $1,000 each will be awarded this year by the American-Scandinavian Foundation to worthy students desiring to study in the universities of Denmark, Norway, and Sweden. Candidates must have received the equivalent of the training usually given for a bachelor's degree, must be of American parentage, and must be nominated by faculty members of the college or school they are attending.

The students chosen will be permitted to select any line of work they care to follow, and may attend school in any of the Scandinavian countries. All applications must reach the secretary of the Foundation at 25 W. 45th St., New York City, before March 15.

## PRIZE AWARDS FOR NEW OCCUPATIONS FOR SHUT-INS

### FIRST PRIZE, $100

**Bertha Graves Morey** — **327 West Fourth Street, Ottumwa, Ia.**

**A New Method of Designing, Making, and Selling Artificial Flowers from Various Materials.**

### SECOND PRIZE, $50

**Mrs. E. W. Hitchcock** — **Hannawa Falls, N. Y.**

**Plan for Organizing and Operating an Employment and Information Bureau by a Shut-In.**

### THIRD PRIZE, $25

**R. S. Andrews** — **221 South Kenilworth Ave., Oak Park, Ill.**

**Plan and Directions for Making Scrapbooks for General and Special Purposes on a Commercial Basis.**

THE suggestions on which these prizes were awarded will be printed in the future issues of Popular Mechanics Magazine. In addition to the prize-winning articles, from the long list of suggestions, many others have been selected for publication in Popular Mechanics Magazine which will be paid for at regular rates. A large amount of valuable material for the occupation of shut-ins will be made available through this magazine.—Editor.

### CLEARING HOUSE AIDS SCIENTISTS ENGAGED IN RESEARCH WORK

Persons engaged in scientific research wishing to communicate with others working along similar lines, now have available a comprehensive clearing house through which information leading to this end may be obtained. The service is supplied by a special bureau of the National Research Council, which has installed a personnel file of 14,000 names, together with a cross index listing the character of investigations being carried on. This latter record shows that research work is now under way in practically all branches of science, including agriculture, animal biology, astronomy, and geography. The council also has a bibliographic service for any who may desire to take advantage of it.

### SUNDAY SCHOOL STAGES "AUTO RACE" TO INCREASE ATTENDANCE

An interesting attendance contest was recently put on with success by the Sunday school connected with the First Presbyterian Church of Fort Wayne, Ind. A large map of the Lincoln Highway, marked by lines every 50 miles, was placed on the front wall of the school, and each class assigned a card bearing the photograph and name of some popular racing car. Starting from San Francisco the cars were advanced each Sunday a distance proportionate to the attendance of the class for that day. Decreases in the number of pupils present meant that the cars were sent back for a corresponding number of miles. The contest closed when the first car reached New York.

### FIVE THOUSAND DOLLARS FOR WINNER OF MOTORBOAT RACE IN SOUTH

Boats, placing in a motorboat race to be run between Miami Beach, Fla., and Havana, Cuba, next winter, will receive $10,000 in prizes, the money being donated by the city of Havana. The winner will be awarded $5,000, the runner-up $3,000, and the third $2,000. The Chamber of Commerce of Miami will supply additional information.

### STUDENTS INVITED TO WRITE ESSAY ON ECONOMIC SUBJECT

Two prizes, of $1,000 and $500, respectively, are offered by Alvan T. Simonds, a member of the board of directors of the United States Chamber of Commerce, for the best essays written by students of a high school, trade school, or normal school on "The Lack of Economic Intelligence, and Some of the Injuries It has Caused to Individual and General Welfare in the United States Since 1860."

For particulars address the Simonds Economic Prize Contest, 470 Main St., Fitchburg, Mass.

### CONTESTS PREVIOUSLY ANNOUNCED

**Medals, Diplomas, and Money Awards:** Announced August issue, 1921; awards offered by the Franklin Institute. The Franklin medal is for workers in technology; the Elliott-Cresson is for original research work and invention; the Howard N. Potts is for important development of previous discoveries and inventions. Each award consists of a gold medal with a diploma. There are also a silver medal, and a Certificate of Merit awarded for meritorious discoveries, and cash premiums for certain work in optics.

**One Million Francs for Best Motor:** Announced January issue, 1922; closes June 1, 1923; address, Aero Club of France, Paris.

**Research Thesis by a Woman: Prize $1,000;** announced October issue, 1921; awarded annually; address, Dr. Lillian Welsh, Goucher College, Baltimore, Maryland.

**Annual Commercial Airplane Contest for "Italy's Great Trophy":** Announced July issue, 1922; address, Aero Club of Italy.

**Best Novel by an American Author:** Prize $2,000; announced August issue, 1922; closes March 1, 1923; address, Harper & Brothers, New York City.

**National Contest for Professional Musicians:** Announced January issue, 1923; closes March 1, 1923; address, Mrs. Charles A. McDonald, 205 Shorb Ave., Canton, Ohio.

**Best Treatise Regarding Immortality:** Prize $1,000; announced January issue, 1923; closes Dec. 1, 1923; address, Contest Editor, 2 West 47th Street, New York City.

**Awards to Further Science of Electricity:** Medals and prizes, amounting in all to about $20,000; announced February issue, 1923. For particulars address General Electric Company, Schenectady, N. Y.

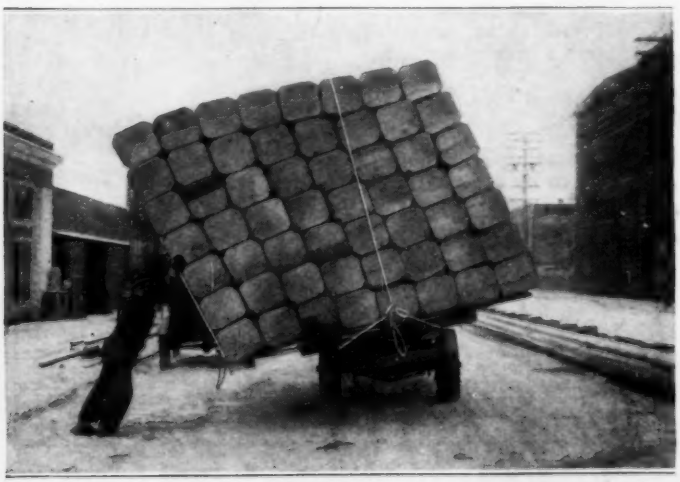
**For Best Paper on Technical Phase of Aeronautics:** Prize $125; closes March 31 of each year. Announced February issue, 1923; address Royal Aeronautical Society of England, 7 Albemarle St., London, W. I., England.

**Names for Great Lakes Steamers:** Two prizes of $50 each; announced February issue, 1923; suggested names must reach the company before the opening of navigation season in 1924; address the Detroit and Cleveland Navigation Company, Detroit, Mich.

**For Best Work by American Chemist:** An annual award of $25,000; announced February issue, 1923; address the Allied Chemical and Dye Corporation, New York City.

**Best Short Story or Poem:** Prizes $100 and $25; announced January issue, 1923; closes March 1, 1923; address, Contest Secretary, Kansas City Chapter, Missouri Writers' Guild, Kansas City, Mo.

**Articles on Chemistry:** Prizes $50 and $25; announced January issue, 1923; closes May 1, 1923; address, Secretary, Canadian Institute of Chemistry, Toronto, Ont.



### QUICK ACTION OF TRUCK DRIVER SAVES LOAD

More like a scene from a motion-picture comedy than a bit of real life is the plight of the rather distressed young man shown here engaged in holding a truck's load of empty vegetable crates. It happened in Seattle, Wash., during a recent cold spell. Shooting along the avenue the driver underrated the skidding possibilities of the street-railway tracks. The result was that the load took a list to one side, whereupon the driver hopped out and began a heroic fight to prevent the crates from toppling over. Fortunately some passers-by came to his assistance, and the load was finally righted. Taking exceptional care to keep at a safe distance from the street-railway tracks, the driver completed the trip without further mishap.